ISSN 1188-4169

Canada Communicable Disease Report

Date of Publication: July 1999

Volume 25S3

Supplement

infection control guidelines

Infection Prevention and Control Practices for Personal Services: Tattooing, Ear/Body Piercing, and Electrolysis

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Infection Prevention and Control Practices for Personal Services: Tattooing, Ear/Body Piercing, and Electrolysis

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Health Canada would like to thank the following provincial and local organizations that sent us copies of their documents related to personal service workers. Their contribution assisted in the development of the manual.

Health Standards and Guidelines for Personal Services
Health Standards and Guidelines for Tattooing
Health Standards and Guidelines for Piercing
Health Standards and Guidelines for Electrolysis
Alberta Health

Guidelines for Personal Service Establishments (PSEs)
Guidelines for Tattooing
BC Ministry of Health and Ministry Responsible for Seniors
British Columbia Ministry of Health

Guideline for the Operation of Tattoo Studios
Manitoba Health

Personal Services Settings Protocol - Infection Control Program
Mandatory Health Programs and Services Guidelines
Ministry of Health of Ontario, Public Health Branch

Tatouage et prévention des infections transmises par le sang
Direction de la Santé publique
Québec

Guideline for Personal Service Facilities
Community Health - Prevention Services Branch
Saskatchewan Health

Le sida et l hépatite B au travail - Mission prévention possible
Cité de la Santé de Laval
Département de Santé Communautaire

Safe Electrolysis - Infection Control Guidelines
East York, City of Toronto
AIDS Committee of Toronto, Metro Council

OTHER COUNTRIES

Infection Control Standards for the Practice of Electrology
American Electrology Association, United States

Standards of Practice for Ear Piercing
Standards of Practice for Beauty Treatment and Electrolysis
Standards of Practice for Tattooing and Body Piercing
Infectious Diseases Unit, Public Health Division
Victorian Government Department of Human Services
AUSTRALIA

Guidelines for Body Piercing
Guide to Hygienic Skin Piercing
King s College School of Medicine & Dentistry
Department of Public Health & Epidemiology
London, ENGLAND

Special thanks for input from the following people who have contributed information about the industry:

Tattooing

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Gary Chynne
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Ear/Body Piercing

Fred Safford
Ear Piercing Manufacturers of the U. S., Inc.
Sterilization, Sanitation, and Safety Standards for Tattooing, Permanent Cosmetics and Body Piercing, 1998.
California Conference of Local Health Officers
NEHA Body Art Model Code and Guidelines

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Electrolysis: Observations from 13 years and 140,000 hours of experience

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We apologize to anyone who assisted us but was not mentioned by name.

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Background

During the fall of 1997, the Division of Nosocomial and Occupational Infections, Laboratory Centre for Disease Control (LCDC), Health Canada, announced a plan to develop infection prevention and control practices or guidelines for three personal services: tattooing, ear/body piercing and electrolysis. The process for development of the guidelines included the selection of a geographically dispersed Working Group with representatives from industry, infection control, environmental health, public health, and LCDC. Some commonly asked questions and answers about the guidelines follow.

1. What is the purpose of the guidelines?

The purpose of the guidelines is to describe infection prevention and control practices for personal services, including tattooing, ear/body piercing, and electrolysis. The guidelines are based on an assessment of potential or documented evidence of infection risk posed by skin piercing procedures and the principles of infection control to manage the risk. The framework of the Harm Reduction Model is used which, if followed, will reduce infection control risks.

2. For whom are the guidelines written?

The guidelines are written for practitioners who perform tattooing, ear/body piercing, and electrolysis. The recommendations for infection prevention and control practices in the personal service guidelines have incorporated practical suggestions from industry representatives. Environmental health officers and infection control practitioners may also find the document helpful.

3. How is the document organized?

The document is composed of three parts:

Part I: Umbrella Document for Overall Infection Prevention and Control Practices

Part 2: Specific Implications of Infection Control in Tattooing, Ear/Body Piercing, and Electrolysis

Part 3: Literature review

4. Will the standards in the guidelines be regulated or enforced?

The guidelines reflect standards of practice for the prevention of infection for tattooing, ear/body piercing and electrolysis. Any regulatory process that governs personal services remains a provincial public health responsibility.

5. How can I obtain further information about the guidelines?

Please contact:

Division of Nosocomial and Occupational Infections
Bureau of Infectious Diseases
Laboratory Centre for Disease Control
Health Canada, PL 0603E1
Ottawa, Ontario K1A 0L2

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For additional information, please call your provincial or local public health department or municipality, or the professional associations for tattooing, ear/body piercing, and electrolysis.

This publication can be accessed electronically via Internet using Web browser at http://www.hc-sc.gc.ca/hpb/lcdc/dpg_e.html#infection.

Part I

Umbrella Document for Overall Infection Prevention and Control Practices

I Introduction

Part I, the Umbrella Document, contains a description of why infection prevention and control practices or guidelines are needed (Section II), an assessment of infection risk posed by tattooing, ear/body piecing and electrolysis (Section III) and general information relevant to the operation of a safe business (Section IV). The Umbrella Document describes the principles of infection prevention and control relevant to these three skin piercing procedures.

The Umbrella Document prefaces Part 2, which describes the equipment, instruments, and procedures used in tattooing, ear/body piercing and electrolysis. Part 3 contains a literature review that describes, in more detail, the infection risk associated with these skin piercing procedures. A reference list and glossary complete the document.

II Why Develop Infection Prevention and Control Practices or Guidelines?

The national guidelines were developed to reduce the spread of infections, including infections from bloodborne pathogens (BBPs),[a] in Canadians. Transmission of BBPs, e.g. hepatitis B virus (HBV), hepatitis C virus (HCV), or human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), can occur from exposure to infected blood/body fluids[1].

[a] See Appendix 1, Glossary of Terms, at the end of the document.

In the skin piercing industry, the documented and theoretical spread of BBPs by needles that are not sterile underlies the need for infection prevention and control guidelines. Documented infections after skin piercing procedures are noted in Part 3: Literature Review and have occurred primarily following tattooing and ear piercing. Evidence of infections following non-ear piercing procedures is more limited. BBP infections have not been reported after electrolysis, as the intent is to enter the natural hair follicle. The recommendations contained in the guidelines are based on an assessment of infection risk in the Canadian population supported by current knowledge of infectious disease transmission, infection prevention and control practices, and epidemiology.

The client s risk of exposure to a BBP infection varies. The more clients there are who have been infected with a BBP before they undergo skin piercing procedures, the more likely that someone else can be exposed during tattooing, ear/body piercing, and electrolysis *unless the needles and instruments are sterile*. Clients are not required to tell the practitioner if they are infected with a BBP.

Because surveillance studies that look specifically at infections related to skin piercing procedures do not exist, the infection risk cannot be defined with accuracy. However, the risk, if the client is exposed to a BBP, may parallel that of a health care worker who is accidentally injured with a needle from a person infected with HBV, HCV, or HIV/AIDS.

If the standards of practice for infection prevention and control in this document are followed they will assist practitioners who pierce skin to protect the health of both their clients and themselves.

III Steps to Assess Infection Risk for Tattooing, Ear/Body Piercing, and Electrolysis

The four components of an assessment of infection risk include the potential risk of spreading infection by skin piercing procedures, the documented infection risk in the literature, the frequency of skin piercing procedures in the population and the proportion of clients who are infected prior to the skin piercing procedure.

1. What is the Potential Infection Risk from Skin Piercing Procedures?

a. Source of Pathogens Causing Infections

To understand why it is important to follow the guidelines to prevent infection in skin piercing procedures, it is necessary to understand potential sources of infection or where these pathogens live.

Humans are protected from many infections by the skin or mucous membranes. When the skin or mucous membrane is pierced, pathogens have a

chance to enter the body. This may result in infection. The pathogens that enter the client s body may come from another person via contaminated objects or from the client s own skin or mucous membrane. Most people have microorganisms on their own skin or mucous membranes that do not cause a problem unless the skin or membrane is pierced or broken.

i. Transfer of Pathogens from Another Person

If the skin piercing object is contaminated, pathogens have a way to enter the body. The skin piercing object becomes contaminated by the methods that follow:

- The skin piercing object is contaminated by the infected blood/body fluids from the client or the practitioner. Pathogens that could be introduced are HBV, HCV, or HIV.
- The skin piercing object is contaminated by pathogens from an unclean work surface in the environment. Invisible pathogens could be contained in very small amounts of blood/body fluids.
- The skin piercing object is touched by the contaminated pathogens on the worker s hands, allowing pathogens to enter the client s body, for example, via the needle.

ii. Transfer of Pathogens from the Clients Themselves

Often, pathogens that are present on the client s skin are harmless until the skin is pierced and they have a way to enter the body.

- Pathogens on the skin enter the body when the skin is pierced with needles, e.g. a wart virus (papillomavirus) on the skin spreads warts on the upper lip[2].
- A mucous membrane is pierced, which permits pathogens to enter the pierced area, e.g. streptococcal bacteria cause a serious infection of tissue from a barbell in the tongue[3].

b. Infections by Contaminated Objects

To help define the chance of infection when a personal services client or practitioner is injured with a contaminated needle, some examples from the health care field are described, since they involve similar situations and the risks are well documented.

i. Accidental Needlestick Injuries

Of 100 health care workers injured with a sharp instrument, e.g. a needle that contains blood infected with HBV, 19 to 30 will become infected with hepatitis B. This risk is reduced to nearly zero if the health care worker has

been immunized and has developed antibodies against HBV. If the health care worker is exposed to HCV, three to 10 people in 100 will become infected; and, if the exposure is to HIV/AIDS, fewer than one person in 300 will develop HIV[1].

ii. Devices That Hold Sharps

In at least three separate situations, patients developed hepatitis B from pathogens on a lancet holder[4,5]. This spring-loaded device holds a lancet, used to pierce a finger so the blood sugar level can be tested. Even though a new sterile lancet was used for each person, it is believed the lancet holder was splattered with blood containing HBV, and the virus was then spread to other patients who later developed the disease. This example emphasizes the importance of cleaning and disinfecting or sterilizing any items that hold sterile sharp objects that pierce the skin.

Blood does not have to be visible on a device to transmit infection. Similarly, it is possible that blood from an infected client that has contaminated a tattoo machine, ear piercing gun, or holder for the electrolysis needle[6] exposes other clients to a risk of infection *unless it has been appropriately cleaned and disinfected.*

iii. Outbreak of Hepatitis B from Contaminated Electroencephalogram (EEG) Needles

In Ontario between 1992 and1996, 75 people were infected with hepatitis B when they had an EEG, which involves placing needles in the scalp. It was reported that the most likely reason for the outbreak was poor infection control practices, which resulted in contaminated needles that spread hepatitis B[7]. The method of doing EEGs in Ontario has since changed to a non-invasive one.

2. What Is the Documented Risk of Infection Following Skin Piercing Procedures?

To determine whether infections have been transmitted to the client or the practitioner performing any of the three skin piercing procedures, a literature search was conducted and the results are reported in Part 3. Other sources of information on the risk and how to manage it are included in resource documents from professional associations, guidelines from most Canadian provinces, and a smaller number of documents from health jurisdictions in other countries.

There are documented cases in the literature of infections acquired during each of these three skin piercing procedures. The infections reported most frequently occur after tattooing, a smaller number after ear or body piercing, and very few after electrolysis. Infections that have been transmitted by skin piercing procedures include hepatitis B, hepatitis C, warts, herpes, and a variety of bacterial skin infections.

The literature contains many other reported non-infectious health risks (not the focus of this document) caused by skin piercing procedures. Complications following skin piercing procedures include sensitivity to tattoo pigments, reactions to metals from body jewelry, and scar tissue formation. A type of cancer, malignant melanoma, has been detected in tattooed skin.

Only a relatively small number of infections have been reported overall in relation to the apparently high number of people who have had skin piercing procedures carried out. This may mean either that the infection risk is low, that infections happen but are sometimes unnoticed, or that infections are noticed but not always reported.

3. How Many People in the Canadian Population Have Had Skin Piercing Procedures?

A number of factors might increase the infection risk to Canadians as a result of tattooing, ear/body piercing or electrolysis. The more people there are who have any one of these skin piercing procedures carried out, the more likely the procedures are the source of BBP infections *unless the needles and instruments are sterile*. Although no one has studied how many people in Canada have undergone tattooing, ear/body piercing or electrolysis, there are some indicators of the frequency of these procedures.

a. The Frequency of Skin Piercing Procedures in Certain Populations

i. Two U.S. surveys reported that 73%[8] and 83%[9] of women had had their ears pierced.

ii. In a Canadian prison, 47% of males and 53% of females had tattoos[10].

iii. In the United States, between 1960 and 1980 the number of women tattooed quadrupled; 50,000 to 100,000 were tattooed annually, nearly half of all tattooing in the nation[11].

b. The Increasing Number Of Tattoo, Body Piercing And Electrolysis Shops in Canada

i. The Capital Region, Edmonton, with a population of approximately 750,000, has 16 tattoo shops that employ 23 tattooists and nine body piercers (Dennis Chu: personal communication, 1998). A 1991 telephone survey of 210 establishments performing personal services found that there were 779 electrolysis treatments weekly in 23 shops and 532 ear piercings in 122 shops (Agnes Honish: personal communication, 1998). Of the 532 weekly ear piercings, 90/122 (40%) were performed in beauty salons.

ii. The Calgary Region, with a population of approximately 800,000, has 12 tattooists, six practitioners who perform both tattooing and skin piercing,

and two who perform skin piercing only (Karolyn Jeffries: personal communication, 1998).

iii. Three voluntary associations for Canadian electrologists[b] have a combined membership of 1,250.

4. How Many Clients Have Been Infected Prior to Skin Piercing Procedures?

Some clients who request skin piercing procedures may already be infected with one or more viruses or bacteria. If a significant fraction of Canadians are infected with BBPs, it follows that the risk during any of the three skin piercing procedures may be increased *unless the needles and instruments are sterile*. However, it is possible that people who undergo skin piercing procedures may have lower or higher rates of infection in comparison to the Canadian population as a whole.

The number of Canadians, per thousand population, infected with BBPs has been estimated: for hepatitis B it is 5 in 1,000, for hepatitis C it is 10 in 1,000, and for HIV it is 1.5 in 1,000[1]. It is important to note that some groups in the Canadian population have much higher rates of infection. For example, it was reported that in a prison population in British Columbia 28 of 100 inmates were positive for HCV[12], and another prison in Ontario reported that 69 of 100 were infected with hepatitis C[13]. The number of Canadians who are infected with other pathogens, e.g. on the skin or in tissue, before undergoing a skin piercing procedure is not known.

IV Infection Control for a Safe Business

1. The Shop

The design of the physical space for skin piercing procedures should be simple, organized, and clean. When practitioners are designing a shop, renovating, or moving into an existing space, they should contact the local health department or municipality for shop requirements and any regulations or standards.

a. Premises

i. Shop zones should be organized to prevent cross contamination of clean, disinfected or sterile equipment with dirty equipment; two separate zones are best.

- clean zone: the customer treatment area should be used for tattooing, ear/body piercing, or electrolysis procedures. All sterilized packages, disinfected and clean equipment should be stored in this area.

[b] Canadian Organization of Professional Electrologists, Federation of Canadian Electrolysis Associations, and Association des électrolystes du Québec Inc.

- dirty zone: a contaminated area, with a washing sink and holding basins, should be available for used items that need to be cleaned and disinfected or sterilized at the end of the day.

ii. General requirements that should be present:

- all surfaces should be constructed of materials that are smooth, non-porous, and easily cleaned;
- good lighting and ventilation;
- hot and cold running water two sinks are recommended: a han d washing basin in the clean zone and a utility sink in the dirty zone. If only one sink is available, care should be taken to avoid contamination of the faucet or equipment that has been cleaned.
- cabinets or storage space (preferably enclosed) are protected from dust and moisture;
- public washroom access.

b. Choice and Use of Instruments and Equipment

i. Instruments

- re-usable instruments should be smooth, non corrosive, and constructed of materials that are able to withstand heat during sterilization, e.g. surgical stainless steel.

ii. Machines

- controls for machines should preferably be foot operated;
- an ultrasonic cleaning device, with a lid, may be used to clean instruments; ***it does not sterilize or disinfect*** but provides excellent cleaning and may prevent injuries to the workers;
- steam (preferably) or dry heat sterilizer, with operator s manual, should be used for sterilization. Dry heat sterilization may be damaging to some products, e.g. the solder used for attaching needles to the needle bar in tattooing may melt in the dry heat oven. The method chosen will depend on the item to be sterilized.
- it is preferable not to touch office equipment, e.g. the telephone, treatment table, or magnifying glass arm, during treatment procedures. If they are used during the procedure, they should be covered with a plastic sheath or cleaned after each client service. Gloves should be changed if the office equipment is used by the practitioner during a procedure.

iii. Necessary Equipment

- packages of sterile instruments and sterile needles;
- metal tray for holding sterile sets of instruments or clean equipment prior to the skin piercing service;
- storage containers, with lids, to store clean items such as cotton balls or small sterile packages, e.g. forceps;
- single-use plastic sheaths or bags to cover items that cannot be easily cleaned, e.g. the tattoo machine, the cord, the plastic spray bottle used to clean and disinfect the skin during tattooing;
- metal basin or other suitable container for dirty equipment.

iv. Necessary Supplies

- medical gloves, e.g. latex, nitrile, neoprene, or vinyl;
- single-use wooden tongue depressors or cotton-wrapped sticks for removing creams, gels, or ointments from a bulk container into smaller, single-use packages;
- clean linen or disposable towels for patient protection or cover for a working surface;
- wrapping materials or suitable containers to contain instruments for sterilization;
- chemical time/temperature and/or humidity sensitive tape, strips or pellets for monitoring each sterilization cycle;
- spore strips or vials for testing the sterilization process monthly;
- liquid hand washing soap contained in a pump style container or cartridge for a wall mounted unit;
- detergent for cleaning;
- commercial sharps containers (puncture-resistant) for sharp waste;
- hospital grade disinfectant(s).

2. Cleaning, Disinfection and Sterilization

a. Cleaning Instruments and Equipment

Contaminated instruments should be cleaned in the dirty zone, preferably in a utility sink. Cleaning removes soil and body materials, e.g. blood, from instruments, equipment, and environmental surfaces. Cleaning **must** occur as a first

step before the disinfection or sterilization process, or the disinfection or sterilization will be ineffective. A step-by-step cleaning guide follows.

Table 1
Steps to Clean Instruments

	Cleaning Process	Comments
1.	Soak items that cannot be immediately cleaned in basin of cool water with or without detergent.	Used instruments should be soaked to prevent blood and other organic matter from drying on the item. **Do not** soak dirty items in hot water or a disinfectant before cleaning, because it causes the soil and matter to stick to the surface of the object.
2.	Put on utility gloves (non-medical gloves).	Utility gloves are suitable for cleaning and have a wider bib at the wrist to help prevent water from entering the inside of the glove. They are also reusable and therefore economical. Some items may require a more delicate glove.
3.	Take instruments apart and rinse in lukewarm running water.	Hot water makes body proteins stick to objects.
4.	Prepare cleaning sink by adding warm water and detergent.	Ensure that objects are visible by using a low sudsing detergent.
5.	Clean instrument surfaces by using friction (washing and scrubbing motions). Use a small brush to clean any crevices or seams in instruments, e.g. hinges.	Scrub below the water surface to prevent splashing into the eyes or on the clothing. An **ultrasonic cleaning device,** with a lid, may be used for cleaning.
6.	Drain dirty water. Rinse cleaned instruments in clean, warm water.	Rinsing removes residual detergent and soil that may impair the function of the instrument or interfere with the action of disinfectants.
7.	Either air dry or dry with a lint free towel.	If wet items are not dried a film may be left on the surface (biofilm), which contains microorganisms.
8.	Store cleaned instruments in a covered container until disinfected or sterilized, if required.	Uncovered, clean instruments may become contaminated by dust or moisture.
9	Remove utility gloves; wash, rinse and hang to dry.	Cleaned utility gloves may be used again as long as the rubber is not torn or punctured.
10.	Wash hands.	Hands should be washed after glove removal to avoid contamination.

b. Cleaning the Environment

It is important to keep the shop clean, as this reduces the chance of cross contamination during skin piercing procedures. Pay special attention to work sur-

faces that may become contaminated by used instruments or equipment, or surfaces touched by the practitioner s unclean hands. The following categories of cleaning are advised:

i. Routine Cleaning

Use a solution of detergent and water to clean dust and soil from all surfaces in the shop. Equipment or surfaces that have been touched and are potentially contaminated during procedures require special care.

ii. Special Cleaning of Contaminated Surfaces

After each client, use gloved hands to clean and disinfect equipment or surfaces that may have become contaminated. A low level disinfectant (see Table 2), mixed according to manufacturers directions and the specified contact time, should be used to disinfect contaminated surfaces. Alternatively, an intermediate level disinfectant, e.g. a solution of household bleach, 1 part bleach and 9 parts water mixed fresh daily (1:10), may be used[1].

iii. Blood Spills

When a blood spill occurs, the practitioner should wear gloves and blot up the blood with disposable towels before applying a disinfectant to the surface area. The towels should be discarded into a plastic-lined waste receptacle. After the spill area has been cleaned, an intermediate level hospital grade disinfectant should be applied to the area for the length of time recommended by the manufacturer. As an alternative, a solution of household bleach and water (as described above) should be left on the surface for 10 minutes[1].

c. Disinfection

In Canada, all disinfectants are registered and given a drug identification number (DIN). This means the manufacturer has to support the claims about which microorganisms the disinfectant kills and its safety for use. When you buy a disinfectant, ask the manufacturer to give you a material safety data sheet (MSDS)[c], which gives information about use of the product and worker safety.

i. Classification of Items for Disinfection

How the item is used determines the classification. Equipment and instruments are classified as noncritical, semicritical, or critical. Table 2 describes the classification of items, the type of disinfectant for each

[c] Canadian Centre for Occupational Health and Safety, Hamilton, Ontario. Internet address: http://www.ccohs.ca

category, and the method of disinfection[1,14], to help you decide the best method. Items must be cleaned before they can be disinfected.

Table 2
Classification of Items for Disinfection

Classification	Disinfectant	Method
NONCRITICAL items that may come into contact with intact skin and /or are used for routine housekeeping	Low level disinfectants are good for noncritical items.	
Items that are rarely contaminated with blood/body fluid, e.g. client chair and table, sponge holder, electrolysis machine arm holding the electrolysis magnifying glass	Detergent is adequate.	Clean to remove dust or soil from items/equipment and surfaces with a solution of detergent and warm water.
Items that are often contaminated with blood/body fluid, e.g. lamp handles, clip cord, dirty instrument tray, tattoo motor frame, tattoo chuck or clamp, pump packs, spray bottle, electrolysis magnifying glass	Low level disinfectants, e.g. quaternary ammonium compounds or Quats , or a combination of a low level disinfectant-detergent; 3% hydrogen peroxide compounds	Clean and follow with low level disinfection for reusable items and environmental surfaces that may be contaminated. Wet or spray a paper towel to wipe the clean item/ surface with the disinfectant prepared and used according to the manufacturer s directions, i.e. allow sufficient surface contact time with the disinfectant.
SEMICRITICAL items come into contact with mucous membrane or non-intact skin, or they hold a sterile item	Intermediate and high level disinfectants are good for items that come into contact with mucous membranes or non-intact skin, or that hold a sterile item.	
Items that cannot be soaked and hold a sterile item that may have been splattered with blood/body fluids, e.g. pin device that holds electrolysis needle	Intermediate level disinfectants, e.g. 70% isopropyl alcohol or 1 part 5.25% household bleach and 9 parts water. Bleach may be corrosive to metals.	Clean item is wet wiped with an intermediate level disinfectant and air dried after each client.
Items capable of being soaked and hold a sterile item that may have been splattered with blood/body fluids, e.g. plastic needle pusher	High level disinfectants, e.g. 2% gluteraldehyde or 6% hydrogen peroxide.	Clean item is soaked for a number of minutes, as specified by the manufacturer, to achieve a high level of disinfection.

Classification	Disinfectant	Method
CRITICAL items enter deep in the skin, e.g. tattoo or ear/body piercing needles, hypodermic needle used during electrolysis, Jewelry	Sterile items must be used to enter the skin.	
	Metal items to pierce the skin should be purchased sterile or packaged and sterilized by a steam or dry heat method.	Pre-sterilized, single use, packaged needles or ear ring studs should be used. Items that are not pre-packaged as sterile must be sterilized. Sterile electrolysis needles should never be saved and re-used on the same client. Chemicals that sterilize are not recommended for critical items as it is difficult to monitor and confirm that sterilization has been achieved and the packaging of items to maintain sterility is not possible.

ii. Disinfectant Types

Disinfectants are grouped into three broad categories (low, intermediate, high) depending on their action, i.e. the ability to kill certain organisms[14] (Table 3).

Table 3
Disinfectant Type and Action

Disinfectant	Action	Comments
LOW LEVEL The most common are quaternary ammonium compounds or Quats . Some phe nols and 3% hydrogen peroxide are included in this group.	Effective for non-critical items. Kills some bacteria and viruses e.g. staphylococcus, herpes, HBV, HCV, and HIV. Does not kill *Mycobacterium tuberculosis*, fungi, or spores.	DO NOT use to disinfect instruments. Always add to water according to the manufacturer`s directions. Generally, not irritating to the practitioner.
INTERMEDIATE LEVEL 70% isopropyl alcohol, 5.25% household bleach, and iodophors, e.g. iodine solutions are included in this group.	Effective for some semicritical items. Kills the microorganisms for low level disinfectants plus fungi but does not kill *Mycobacterium tuberculosis*, or spores.	Mostly non-toxic, but some iodophors and bleach burn skin and stain fabrics. Bleach mixture: 1 part bleach and 9 parts water should be prepared every 24 hours. Household bleach is not a good choice for disinfection of metal instruments or equipment as corrosion is a problem.
HIGH LEVEL Common examples are 2% gluteraldehyde and 6% hydrogen peroxide (stronger than the 3% hydrogen peroxide found in the drug store).	Used for semicritical items and for critical items that cannot withstand heat sterilization. Kills all viruses, bacteria (including *Mycobacterium tuberculosis*) but does not kill spores. These products are able to sterilize objects with longer soaks according to times suggested by the manufacturer.	Gluteraldehyde is non-corrosive but is irritating to the skin, and vapours are toxic. NEVER use gluteraldehyde as a spray. Good ventilation is required when using this product. 6% hydrogen peroxide can be corrosive to some metals, e.g. aluminum.

d. Sterilization (Table 4)

All items that pierce the skin **must** be sterile. Single-use needles purchased as sterile must be used before the expiry date and should not be reused or resterilized. Skin piercing objects, Jewelry, and direct instrument attachments, e.g. needle bar for tattooing, forceps and tweezers for electrolysis, must be sterilized by the practitioner.

Any sterile instruments that are accidently touched or are contaminated in any other way, either before or during treatment, should be replaced by another sterile instrument or needle.

All items for sterilization must be **pre-cleaned** and appropriately packaged prior to sterilization. Wiping instruments with disinfectants does not sterilize

them. Successful steam/heat sterilization depends on time, temperature, pressure (in the autoclave), and full contact with the item to be sterilized.

i. Packaging and Loading of Instruments[15]

- Instruments are packaged in paper, plastic, or paper/plastic peel-down pouches/bags to protect the instrument when it is sterile and permit removal without it becoming contaminated.
- Paper/plastic peel-down packages offer good visibility but have limited strength.
- Plastic/paper packaging must not be reused.
- Instruments for one client may be grouped into one bag or in sets on a tray or metal container.
- Packaged items are loaded into the sterilizer to allow all items to be in contact with steam.
- Chemically treated paper bags or tape are available that change colour when the load has been exposed to the required combination of time, temperature, and steam; chemical indicators do not provide proof of sterilization.
- Biological spore test is the accepted standard for proof of sterilization.
- Packages for sterilization should be dated to ensure rotation of supplies.

ii. Type of Sterilizer

One of two methods of sterilization should be used for skin piercing equipment: steam autoclave (steam under pressure) or dry heat sterilizer.

- STEAM AUTOCLAVE

The autoclave sterilizes more rapidly than the dry heat method and is the recommended method of sterilization for skin piercing items. It may also be used to sterilize liquids. The common steam sterilizer temperature is 121° C (250° F) with pressures that are preset by the manufacturer[15]. The length of time required for sterilization depends on whether the instrument is packaged or not. Packaged items at a temperature of 121° C normally require a sterilization time of 30 minutes or a temperature of 133° C for 15 minutes, although unpackaged items may require less time. **Always follow autoclave operator manual instructions for sterilization.** Some autoclaves do not have a drying cycle and the door must be left slightly open to allow the packages to dry. If the packages are removed when wet, contamination may occur.

- **DRY HEAT STERILIZER**

The dry heat sterilizer relies on heat only and requires longer exposure times than when steam and pressure are used. The door must remain closed throughout the process. Examples of temperatures required for sterilization are[14]:

171° C for 60 minutes
160° C for 120 minutes
149° C for 150 minutes
141° C for 180 minutes
121° C for 12 hours

The advantages of dry heat sterilization include minimal rusting and corrosion of instruments. This method can also be used for glass and powders, and may be useful for instruments that cannot be taken apart. A disadvantage of the process is that paper packages may burn. Because of limited options for packaging materials and longer heat exposure times, the dry heat sterilization method is seldom used in the skin piercing industry. **Always follow operator manual instructions for sterilization.**

NOTE: Sterilization cannot be achieved by using a glass bead sterilizer, microwave oven, domestic oven, pressure cooker, boiling pot or ultraviolet sterilizer.

iii. How to Monitor Sterilization

Chemically treated paper bags or tape that changes colour must be used to confirm that the items in each load to be sterilized have been exposed to the required combination of time, temperature, and steam. Chemical indicators do not provide proof of sterilization.

The only sure method to show that sterilization has been achieved is to use the spore test. To monitor steam sterilization, the spore (*Bacillus stearothermophilus*) strips or vials should be placed into the centre of the load during a regular cycle in the sterilizer. To monitor dry heat sterilization the spores of *Bacillus subtilis* should be used. The spore test should be then sent to a laboratory where it is tested for spore kill. The test should be performed before the equipment is first used for procedures and once a month or more frequently, depending on use. If a positive spore test occurs, the use of the autoclave should be suspended until the autoclave function is checked. Consult a laboratory or health inspector in your area to obtain test strips and for advice regarding a positive test.

Regular maintenance of the sterilizer should be scheduled as per manufacturers instructions or more frequently if necessary. Service records should be logged and kept for information. All staff involved in the sterilization of instruments/equipment should be trained to operate the sterilizer.

iv. Storage of Sterilized Instruments/Equipment

- sterilized items must be kept sealed in the original package/set until just before use;
- sterilized items must be stored in a clean, protected, dry area where dust, moisture, and vermin cannot disturb the equipment;
- single instruments from a package of multiple sterile instruments must be removed with forceps (which have been sterilized and packaged as a single item). The package must be sterilized again.
- packages that are torn, punctured or wet should not be used as sterile;
- frequent handling of sterile packages should be avoided.

Table 4
Steps for Sterilization

Steps	Comments
Clean instruments as per Table 1: Steps to Clean Instruments.	Instruments that are not clean cannot be effectively sterilized.
Wash hands.	Unclean hands will put debris on clean objects, and sterilization may not be accomplished.
Package cleaned instrument.	Paper/plastic peel-down pouches or sets on trays or in metal containers should be used.
Place chemically treated tape or thermal indicator on bags that change colour.	Heat indicator tape or bags should be used on each load to monitor exposure to steam or heat.
Load the sterilizer evenly and do not overload the chamber. Packs should rest on edge in loose contact with each other. Packs should not be oversized.	Overloading will prevent the sterilizer from doing the job. Tight packing of instruments and trays should be avoided.
Set appropriate dials to start the sterilization process.	Monitor the sterilizer to verify it is achieving sterilization by including the spore test at least once month. Place the spore test in the autoclave as per manufacturer s instructions.
Remove items when dry.	Leave the autoclave door ajar to permit drying of packages.
Store sterilized items in a clean, dry, place that is protected from dust, dirt, moisture and vermin.	Handling increases the chance of punctures of sterilized bags. DO NOT use damaged packages.

3. Infection Prevention Practices for the Practitioner

Once items are cleaned, disinfected and sterilized, the practitioner should keep equipment and instruments free of contamination. Clean and aseptic procedures are dependent on the practices of the practitioners. The next section describes how to keep items clean and/or sterile.

a. Asepsis

The skin piercing object must be sterile at the outset of the procedure and should not become contaminated with another client s blood or the blood of the practitioner during the procedure. The skin piercing object should be protected from contamination by the following practices:

- Wash hands before and after wearing gloves.
- Keep items used during a procedure within easy reach to avoid accidental contamination. The equipment used during the procedure should be positioned above waist level and clearly visible to the practitioner.
- Do not touch contaminated areas with a sterile object.
- Keep environmental objects clean, e.g. cord that you touch during the procedure.
- Concentrate on the activity, and change the skin piercing object if it becomes contaminated.

b. Hand Washing

Hand washing is the ***single most important practice*** to prevent cross-infection in the client and the practitioner.

i. When should hands be washed?

- before and after touching the client
- before handling and opening sterile supplies
- after handling contaminated items
- before and after removing gloves
- before eating
- after using the toilet or blowing one s nose
- when in doubt about the need to wash your hands.

ii. How should hands be washed?

- rinse hands under warm water;
- lather with soap and use friction to clean the hands and fingers for 10 seconds;
- rinse hands under warm running water;
- dry hands thoroughly with a single-use towel; use the towel to turn off the tap or use elbow/foot operated taps.

c. Barriers

i. Medical gloves should be worn for all procedures that might involve skin or mucous membrane contact with blood or fluid capable of transmitting BBPs as an added barrier to protect the practitioner s hands from becoming contaminated. Gloves also afford the practioner some protection from sharps injuries. Hands should always be washed before gloves are put on and after they are taken off.

Latex allergies are a growing concern to both clients and practitioners. Common symptoms include skin rash, runny nose and/or eyes, asthma and, less commonly, more severe breathing problems. Individuals with latex allergies should be referred to a dermatologist or allergist for advice. Non-powdered, low-protein latex gloves may solve the problem or, in some cases, latex may have to be avoided completely[14].

ii. Masks are not routinely necessary unless the practitioner or client has a respiratory tract infection, e.g. a cold.

iii. Smocks, aprons, uniforms, lap pads and other outerwear may be used to protect clothing. If worn, these items should be laundered regularly and when soiled.

4. Skin Care Before and After the Piercing

Skin preparation before skin piercing procedures should involve a skin inspection and cleaning with an antiseptic.

a. Skin Inspection

The skin should be inspected to ensure that there is no abnormality or sign of infection. Skin should not be pierced if there are signs of infection such as warts, pimples, crusts or open skin areas.

b. Skin Preparation

The skin piercing site should be disinfected using a skin antiseptic, which is applied with a clean cotton ball or gauze. The clean cotton ball or gauze may be moistened with the antiseptic that flows in a stream from the pump container. When the pump is empty, the container should be washed and dried before it is refilled. Alternatively, disposable pre-packaged antiseptic swabs may be used.

c. Skin Care Following the Piercing

New gloves should be worn when antibacterial lotions or ointments are applied to freshly pierced areas. If the lotion or ointment is removed from a bulk container, a single-use spatula, e.g. tongue depressor, should be used to avoid contamination of the bulk container. In some skin piercing procedures, a dry sterile dressing is applied.

Oral and written instructions for care at home should be provided to the client. The signs and symptoms of possible complications should be discussed. Advise the client how to deal with slight redness, pain and swelling. The client should be advised to seek medical advice if infection develops. Do not remove Jewelry from an infected piercing but seek medical advice.

5. Waste Disposal

The waste generated in a skin piercing shop should be segregated and disposed of according to municipal/provincial regulations. Some general guidelines follow:

a. Regular Waste

Regular office waste such as office paper or single-use paper hand washing towels may be discarded in regular waste paper bins.

b. Contaminated Waste

Blood-contaminated waste should be disposed of in plastic bags and tied before being put in regular waste pick-up. It is preferable to avoid having waste receptacles with a swinging lid in the skin piercing area as they are touched, and therefore are contaminated.

c. Sharps

Sharps such as needles or razor blades should be placed in puncture-resistant sharps containers that are handy to where the practitioner is working. Sharps should not be sterilized or disinfected before disposal because decontamination may not be certain and handling of sharps may pose an unnecessary risk

of injury to the practitioner. Some pharmacies may exchange full sharps containers for empty ones. Contact your local public health unit or municipality for instructions regarding disposal of sharps containers in your area.

6. Client Records

A record of each skin piercing procedure should be kept, including the client s name, date of birth, address, phone number, date of procedure; practitioner s name; and site of procedure. Information contained in records may be useful if any infection occurs. Records should be kept in accordance with local requirements and, if not stated, for a minimum period of one year.

7. Practitioner Health and Safety

a. Bloodborne Pathogen Precautions

Bloodborne pathogen (BBP) precautions were previously called Universal Precautions.

In 1987, Health Canada published guidelines to prevent HIV/AIDS transmission to practitioners who come into contact with blood. The principles of BBP precautions are contained in an updated document published in 1997, *Preventing the Transmission of Bloodborne Pathogens in Health Care and Public Service Settings*[1]. Any effective approach to the prevention of the transmission of BBPs is based on the assumption that all blood and certain body fluids are potentially infectious. Precautions applied to all patients for all procedures that might involve skin or mucous membrane contact with blood or fluid capable of transmitting BBPs may reduce the exposure of personal service workers to blood. The basic components of BBP precautions include immunization, hand washing, protective attire, e.g. medical gloves, prevention of needlestick injuries, and cleaning of blood spills.

b. Immunization

All staff who perform skin piercing procedures should have up-to-date immunizations as recommended for adults in Canada, including diphtheria and tetanus every 10 years[16]. Because of potential exposure to blood, practitioners are advised to receive three doses of hepatitis B vaccine, which offers 95% protection against hepatitis B infection. There is no vaccine for hepatitis C or HIV/AIDS.

c. Chemical Hazards

A Material Safety Data Sheet (MSDS) for each chemical, e.g. disinfectant, should be kept on the premises. The MSDS provides information on the toxic effects to humans, e.g. skin contact or inhalation; instructions for safe handling;

and emergency procedures if accidental splashes or swallowing of the chemical occur.

d. Hand Care

Healthy skin with no cracks is an excellent barrier to pathogens that cause infection. Use hand cream frequently on washed hands throughout the day and after work.

Practitioners with skin lesions or breaks in the skin should wash well and cover the area with waterproof dressing before putting on gloves. If this cannot be done, the practitioner should refrain from working with clients until the skin condition has healed.

e. Sharps Injuries

Contaminated sharps should be disposed of in puncture proof containers immediately after use to avoid accidental sharps injuries. The more blood there is in the hollow bore of a needle, the deeper has been the insertion of the needle, and the higher the level of viral activity in the blood from active disease; the more likely that a person who is injured will be exposed to the infection, and that there will be transmission of disease[17].

i. A sharps injury to a worker is defined as:

- a poke or scratch with a contaminated needle;
- a cut on contaminated equipment;
- a blood splash onto practitioner s skin that is cracked or otherwise broken;
- a splash of blood or contaminated fluid on a practitioner s mucous membranes, e.g. mouth or eyes.

ii. After an accidental exposure to blood the following is recommended:

- Allow the punctured area to bleed freely.
- Wash the punctured area with soap and running water. If the eye or mouth is involved, flush it well with water.
- Apply a skin antiseptic and cover with a dry dressing.
- Obtain the name, address and phone number of the client and tell him/her that blood tests may be required.

- Immediately call the doctor or local public health department for advice, as preventive treatment may be advised.
- Document the injury.

f. Practitioner Education for Infection Control

All practitioners and shop employees should receive instruction about infection prevention and control to ensure a safe environment for workers and clients. Call your local public health unit or municipal health service for assistance with infection control. Practitioners should understand written procedures and be able to apply them practically.

Practitioners should not eat, smoke or drink beverages while working with the client.

Part 2

Specific Implications of Infection Prevention and Control in Tattooing, Ear/Body Piercing and Electrolysis

Guidelines for Infection Prevention and Control in Tattooing

I Introduction

Tattooing has been reported as the source of many types of infection as well as of numerous skin reactions produced by pigment in the skin (See Part 3: Literature Review). The potential for the spread of pathogens exists because blood comes to the skin surface during tattooing. Tattoo needles are the most likely way to introduce pathogens into the body. Therefore the needles and the devices that hold them must be sterile at the outset of the procedure. All remaining tattooing infection prevention and control practices, including safer handling of instruments and equipment, are intended to reduce the chance of pathogen transmission from one person to another during tattooing. Unsafe infection prevention practices place the practitioner and the client at risk of infection. Avoiding sharps injuries and other exposures to the client s blood will reduce the chance of infection in the practitioner.

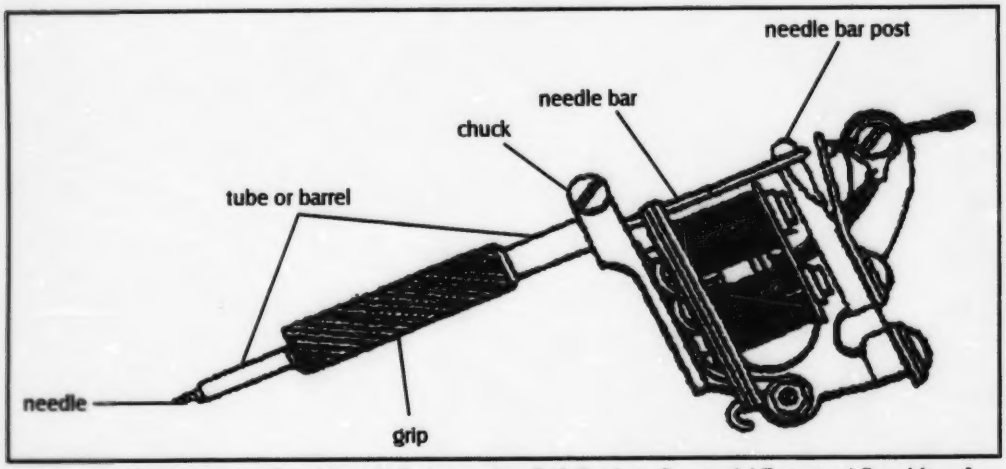
II What Is Tattooing?

The practice of tattooing dates back to prehistoric times as a form of permanent body adornment for individual expression, identity, rites of passage and, more recently, as a form of permanent cosmetic make-up for women.

Tattooing permanently deposits pigments into the skin to a depth of 1-2 mm, which creates an imprint of a design. The design is either drawn free hand by the artist or more commonly follows a stencilled design that has been copied onto the skin prior to tattooing. Cosmetic tattooing may be used for eyelids and nipples. The contemporary electric powered tattoo machine vibrates a cluster of fine needles several hundred times a minute creating a series of skin punctures. The solid needles impregnate pigment into the skin. Other facts about the tattooing procedure follow:

- Tattoo needles are soldered onto a long, moveable shaft called the needle bar, which is placed into a stainless steel tube that serves as the grip . Durin g tattooing, the needle bar (with mounted needles) protrudes from the end of the tube, driven by the needle bar post (see Figure 1).
- The number of needles on the needle bar varies depending on the effect desired: a single needle for fine outlining, three to four needles for thicker lines, and up to 14 needles for shading or dense deposits.
- The protruding needles are dipped into tattoo pigment that is poured into individual caps or cups for each client.

Figure 1
The Tattoo Machine*



* Adapted with permission: Spaulding, H *Tattooing A to Z (A Guide to Successful Tattooing)* Spaulding & Rogers Mfg. Inc.1998: 31.

- Pigments used during tattooing may be purchased in liquid form, or the practitioner may prepare the product using chemically pure, non-toxic and non-sensitizing pigment powder and other ingredients according to the manufacturer s instructions. Dyes and pigments containing mercury, e.g. cinnabar/vermilion/red mercuric oxide, are not permitted to be used in Canada[18]. Pigments should be prepared in a hygienic manner.
- The needles penetrate the outermost layer of skin (the epidermis) and reach the next layer (the dermis). During tattooing, excess pigment and blood is wiped away with tissue or paper towels.
- Tattooed skin heals in about two weeks. Immediately after tattooing, the skin swells slightly and a small amount of bloody to colourless body fluid comes to the surface. The swelling lasts for a few hours, and then the skin is inflamed much like a sunburn.
- Tattoos are permanent, although over many years colours fade and borders become less distinct. Tattoos may only be removed by special medical procedures, e.g. lasers, which are expensive and not always effective.

III Infection Prevention in Tattooing

The most critical item for infection risk during tattooing is the set of needles mounted in the needlebar. Needles must not be cleaned in the ultrasonic cleaner and reused with a new colour, as the needles are not sterile. Needles cannot be sterilized for reuse because their very close placement to each other when soldered onto the needlebar means that they cannot be adequately cleaned (even if the ultrasonic cleaning device is used). Because the needles have contact with

the client s bloodstream in tissue under the skin, the **sterile needles must be used only for one tattooing session, on only one client**. Used needles should be carefully removed from the needlebar to reduce the risk of needlestick injury to the practitioner and placed in the sharps container.

Careful handling of the tattoo needles during the procedure reduces infection risk. The following sections 1 through 3 list tattooing instruments and equipment, their use during tattooing, and procedures for infection prevention and control. Part I: Umbrella Document provides the details necessary for full implementation of this guideline.

CAUTION: Some individuals may have an allergic reaction to even the most pure and non-toxic pigments. If the client shows any type of allergic reaction during the tattooing process, e.g. paleness, shortness of breath, difficulty breathing, undue swelling, or puffiness around the eyes, the tattooing process should be stopped and immediate emergency medical attention should be obtained[18].

1. Equipment and Supplies

The practitioner will need the following equipment to carry out safe tattooing procedures. Special equipment and supplies are available in Canada or the United States. Additional supplies are readily available locally from medical and dental supply outlets.

- Ultrasonic cleaning device
- Sterilizer (autoclave)
- Instrument packaging (for sterilization)
- Bacterial spore test (strip or vial)
- Tattoo machine with clamp or chuck
- Clipcord
- Grip and tube assembly
- Needles
- Needle bar
- Elastic bands
- Stencil transfers (disposable) or Plastic stencils (reusable)
- Forceps
- Metal container for used instruments
- Metal container with lid for sterile items
- Pump pack (for antiseptic)
- Image transferring solution
- Heat indicator strips for sterilizing
- Solder gun/solder
- Brush (for cleaning)
- Sharps disposal container
- Spray bottle (with soap and water)
- Razor
- Pigment (ink)
- Caps/cups for pigment
- Tray to hold caps/cups
- Towels (paper)
- Tray
- Skin antiseptic
- Lubricating gel
- Hand washing soap in pump container
- Lap pad or protective clothing
- Dressing/gauze
- Ointment (single use or bulk)
- Wooden tongue depressor(s)
- Disinfectant(s)
- Disposable paper cup (tap water)
- Cloth/paper protector (for furniture)
- Plastic sheath or bags
- Medical gloves

2. Preparing the Work Station and the Client for Tattooing

a. Position the client comfortably.

b. The skin/tissue should be assessed prior to tattooing. If any skin/tissue abnormality exists, the tattooing procedure should not be performed.

c. Ensure that the work area is large enough to arrange all equipment that is needed.

d. Furniture that will have direct contact with the client s skin should be covered with paper or clean cloth.

e. Disposable paper towels should cover work surfaces and metal trays where tattooing equipment or supplies will be placed.

f. The tattoo machine, clipcord, and spray bottle(s) should be covered with plastic. Any other surfaces that are touched with contaminated gloved hands should be covered with plastic, e.g. lamp handles. The plastic should be replaced after the treatment of one client and before the next one.

g. The sharps container should be placed in a convenient location in the workstation to permit immediate disposal of sharps after use.

h. A metal container with water should be placed on a counter in the work area for holding dirty instruments until they can be cleaned.

i. All items used for the tattooing procedure should be positioned within easy reach of the practitioner to prevent accidental contamination of instruments.

j. A plastic-lined waste bin should be placed within reach of the practitioner for the disposal of non-sharp items contaminated with blood.

k. The sterile needles, needlebar, grip and tube assembly should be assembled with gloved hands in a manner that avoids contamination of needles. It is good practice to open packages containing sterile needles in front of the client.

l. When the treatment is complete, dispose of needles in the sharps container in front of the client.

3. Detailed Infection Prevention and Control Procedures for Tattooing

Table 5 provides a list of tattooing equipment and supplies, their use during tattooing, and a practical method of applying infection control principles, which should be followed, unless the manufacturer provides written instructions stating otherwise.

Table 5
Detailed Infection Prevention and Control Procedures for Tattooing

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
1.	Skin preparation:		
	spray bottle with a solution of soap and water	The skin area to be shaved is sprayed with the solution for lubrication purposes.	The spray bottle should be covered with a single-use plastic sheath, e.g. plastic bag. This plastic should be discarded after each client service. At the end of each day, or when soiled, the spray bottle should be cleaned and disinfected with a low level disinfectant.
	single use disposable razor	The skin is shaved prior to tattoo placement.	Razors should be discarded in the sharps container after use on each client.
	skin antiseptic, e.g. 70% isopropyl alcohol	Antiseptic is used to clean and disinfect the skin prior to tattooing.	The skin antiseptic should be applied with a cotton ball/gauze or swab using a circular motion. If alcohol is used, it should be stored in a pump pack that is used to moisten the cotton balls. Alternatively, the cotton balls/gauze may be moistened by pouring the antiseptic from the original container into a disposable paper cup. The disposable cup should be discarded in the waste bin after use. Skin antiseptics should not be applied to the skin with a spray pump. For cosmetic tattooing of areas around the eye, e.g. eyeliner, water should be used and an antiseptic should be avoided.
2.	Stencil and image transferring solution:		
	lotion or spray bottle with solution as above, skin antiseptic, e.g. 70% isopropyl alcohol	Lotion or other solution moistens the skin prior to application of the stencil.	Lotion should be applied in the same way as skin antiseptics OR with spray bottle. Deodorant sticks are ***not*** recommended instead of lotion.
	single use stencil transfers or plastic reusable stencils	Stencils are used to outline the design of the tattoo on the skin	Single-use stencils should be discarded after use. If plastic stencils are used, they should be cleaned and disinfected with detergent after use on each client. If the skin was broken, 70% alcohol should be used to wipe the stencil.

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
3.	Lubricating product, e.g. gel or petroleum jelly	The lubricating product is placed on the skin with a single-use spatula or a piece of clean gauze prior to tattooing.	The lubricating product should be removed from bulk container with a single-use wooden spatula or dispensed from a pump container onto a single-use applicator, e.g. clean gauze. Any remaining product must be discarded and never used on another client. Alternatively, a single-use preparation may be used.
4.	Tattoo dyes:		
	pigments/ink	Sterile needles, which have been dipped into pigments, pierce the tissue below the skin to create the permanent tattoo.	Currently, commercially prepared pigments are not sterile and attempts by practitioners to sterilize the dyes have not been successful. Contamination of pigment bulk containers should be avoided by placing pigment in smaller containers, e.g. plastic squeeze bottles.
	caps/cups	Each unique pigment is placed in an individual cap/cup into which the tattoo needles are dipped.	The pigments used for one client should be poured into clean, single use plastic caps or disposable cups. The caps/cups and any leftover pigments should be discarded after use with each client.
	pigment cap holding tray	Trays are sometimes used to hold the pigment caps.	The pigment cap trays should be cleaned and disinfected with a low or intermediate level disinfectant after use with each client.
	disposable cup with tap water	Tap water is used to rinse pigment from the needles prior to using another colour.	Water should be poured into the dirty zone sink at the completion of the procedure. Discard disposable single-use cups into a plastic lined waste bin.
5.	Cleaning the skin during tattooing:		
	spray bottle containing a solution of soap and water as in #1.	The skin is cleaned to enable the practitioner to see it clearly and to avoid the mixing of colours.	Care should be taken to avoid contamination of the soap solution when it is being prepared and during use. The spray bottle should be covered and cleaned/disinfected as in #1. The solution should not be topped up with more solution. The inside of the bottle should be washed and dried prior to adding new solution.
	disposable paper towels	Paper towels are used to wipe the sprayed area during tattooing.	All towels should be discarded into a plastic lined waste bin.

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
6.	Tattoo machine:		
	motor frame clipcord	The motor frame is connected to an electrical source by the clipcord. The clipcord may be touched multiple times if one or more machines are used during tattooing on one client.	The clipcord and the motor frame should be covered with a disposable plastic sheath. The plastic sheath should be discarded after each client service. The clipcord and motor frame should be sprayed and cleaned with an intermediate level disinfectant after each use, e.g. 70% alcohol.
	chuck or clamp	The chuck/clamp attaches the needle bar/tube to the motor frame.	After each client service the clamp should be cleaned and wiped with a low level disinfectant.
	elastic bands	The elastic bands apply pressure on the needlebar so that the needles that rest in the bottom of the tube tip.	The elastic bands are discarded into the waste bin.
7.	Instruments:		
	needles, e.g. stainless steel needle bars	Needles are soldered onto needle bars. The needles place pigments in tissue under the skin.	Any flux residue produced by soldering should be removed with a solution of baking soda and water prior to cleaning. New needles and the needle bar should be cleaned, e.g. in an ultrasonic cleaning device, and should be sterilized in covered metal containers or suitable packaging. Needles must not be tested on the practitioner s skin. Needles that have been cleaned in the ultrasound between colours are not sterile and therefore should not be used. Used needles should be discarded into a sharps container after use and should not be reused.
	metal tube and grip (as one unit or as separate parts)	The metal tube and grip assembly surrounds the needle and needlebar and is attached to the motor frame.	Metal tubes and grip should be cleaned and sterilized for each client use. Because the grip is grooved metal, a brush should be used during cleaning.

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
	forceps	Sterile forceps are used to remove sterile items from a multiple item instrument container.	Forceps should be cleaned, packaged, and sterilized after each use.
8.	Metal container with lid	The container for used instruments is kept in the dirty zone, and is partially filled with water, or water and detergent to prevent drying of body proteins on soiled instruments before cleaning.	The metal container should be cleaned and disinfected with a low level disinfectant daily.
9.	Cleaning products/devices:		
	detergent and water	Detergent and water is used for cleaning instruments/equipment and surfaces in the work environment.	Detergent is a product designed for medical cleaning.
	ultrasonic cleaning device	The ultrasonic cleaning device contains detergent and water to clean instruments after treatment with the client is finished. Cover the device with a lid to prevent splatter when in use.	The ultrasonic cleaning device should be emptied and cleaned daily with detergent and water. The ultrasonic cleaner **cannot** disinfect or sterilize instruments. Needles cleaned in this manner, i.e. critical items, should not be reused.
10.	Disinfectants:		
	low level, e.g. quaternary ammonium compounds, detergents	Low level disinfectants remove pathogens from work surfaces.	Low level disinfectants should be used to disinfect noncritical items, e.g. work surfaces, service tray. The disinfectant should be prepared and used according to manufacturers directions
	intermediate level, e.g. 5.25% household bleach; 1 part bleach and 9 parts water	Intermediate level disinfectants remove pathogens from work surfaces/equipment.	Intermediate level disinfectants, e.g. bleach and water solution (1 part bleach and 9 parts water) may be used in place of a low level disinfectant to disinfect work surfaces and equipment, e.g. pigment caps.

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
	high level, e.g. 2% gluteraldehyde or 6% hydrogen peroxide	High level disinfectants disinfect semicritical items that are in contact with sterile critical items.	The tattoo gun should be wiped with 70% alcohol following use with each client.
11.	Sterilization equipment and supplies:		
	steam autoclave or dry heat sterilizer	The sterilizer is used to kill microorganisms on instruments. The sterilizer is usually stored in the dirty zone of the shop.	Steam or dry heat should be used to sterilize critical items that may come into contact with the client s bloodstream. Sterilized items should be kept in the clean zone of the shop.
	instrument bags or clean metal container with lid	Contains needles, needlebars, and grip/tube assembly during and after the sterilization process.	Needles and needle bars should not puncture bags used for sterilization as the needles will no longer be sterile. Metal or other puncture-resistant containers eliminate this potential problem.
	heat indicator tape	Heat indicator tape or heat indicator bags should be used with each load that is placed in the sterilizer.	The heat indicator tape verifies that the correct exposure to heat or steam has been reached for that load.
	spore test strips or vials	The spore test confirms that the sterilizer kills all microorganisms.	The spore test should be performed at least once every month to monitor the effectiveness of sterilization.
12.	Sharps container (with lid)	For disposal of needles and razors.	Puncture-resistant containers should be used to hold used sharps in order to prevent sharps injuries. Sharps containers should be sealed and discarded in accordance with local regulations.
13.	Client after-care products:		
	dry sterile dressing ointment/cream/ lotion	The ointment or lotion and dry dressing are applied to freshly tattooed skin to help prevent infection and protect the client s clothing.	Ointment should be applied with single use applicator and gloved hands. The tattooed skin should be covered with a dry sterile dressing. The client should be given oral and written instructions about care of the tattooed area, and signs of infection that may require medical treatment.

	Equipment/ Supplies	Use During Tattooing	Procedures for Infection Prevention
14.	Practitioner supplies:		
	hand washing soap	Soap is used to clean the practitioner s hands of transient microorganisms.	Refer to recommendations in the Umbrella Document .
	hand lotion	Lotions are used to keep the skin in good condition.	After the skin has been washed with an antiseptic agent and the packages containing the needlebar(s)/sterile needles have been opened, gloves should be put on to remove the needlebar(s)/sterile needles from the package and assemble them on the grip and tube assembly. Gloves should be removed and changed any time during the tattooing process if the practitioner touches any device or surface that may be contaminated. Hands should be washed before and after glove removal.
	medical gloves (new, latex, neoprene, nitrile, or vinyl)	Gloves should be used as a protective barrier on hands.	
	lap pad (single use paper or reusable cloth)	Worn on the lap of the practitioner to protect clothing.	Single use disposable lap pads should be used. If the lap pad is cloth, it should be laundered after each client service.

For the health and safety of the practitioner, please see Part 1: the Umbrella Document.

Guidelines for Infection Prevention and Control in Ear/Body Piercing

I Introduction

Ear piercing (piercing of the ear using a "gun") and more recently body piercing (piercing of any part of the body using a "needle") have become an established custom for the attachment of Jewelry to body parts. Numerous infections and other health related complications have been reported as a result of skin piercing (see Part 3: Literature Review). Ear/body piercing is the most invasive of the three skin piercing procedures, as the skin piercing device enters the body at one point and comes out at another. Because the needle or Jewelry used to puncture the skin comes into contact with the client s tissue and bloodstream, the potential for the spread of pathogens exists. Local infections of the skin piercing site are common because the inserted Jewelry slows healing and keeps the tissue open and more susceptible to invading pathogens. Unsafe infection prevention practices will place the client and the practitioner at risk of infection.

The main focus of this guideline is to prevent client infection during ear/body piercing by preventing contamination of the ear/body piercing needle or Jewelry. The guideline also describes infection prevention practices to reduce the chance of infection in the practitioner performing ear/body piercing. Part 1: Umbrella Document provides the details necessary for the full implementation of this guideline.

II What Is Ear/Body Piercing?

Ear/body piercing involves the insertion of metal Jewelry, e.g. rings, studs, barbells, into tissue. Sites that are frequently pierced include the ear lobe, ear cartilage, nose, navel, lip, tongue, nipples and genitals. Some body sites have a higher number of bacteria, i.e. nose, navel and genitals, and therefore may pose a greater infection risk.

The most common techniques used by the practitioner to pierce the skin are either those involving needles (with corks, receiving tubes or insertion tapers) or ear ring studs and an ear piercing gun.

1. Needle Technique

Piercing needles are purchased from a specialty supply outlet or are prepared in the shop by removing the hub from a hypodermic needle intended for medical use. The diameter of the hollow needles may vary from 6-18 gauge, although smaller and larger diameters can be used. The blunt end of the

needle is used to hold the jewelry as the needle and the jewelry are inserted through the tissue in one motion. Other instruments that aid in the procedure but do not pierce the skin may include forceps, needle pushers, insertion tapers and receiving tubes. The needle is passed through the tissue and out the other side. The needle point is often pushed into a cork following insertion of the needle through tissue to avoid injury to the client and the practitioner. The jewelry pushes the needle out through the tissue channel created by the said needle. Most professional body piercers use the needle insertion technique to place jewelry in various parts of the body.

2. Ear Piercing Gun Technique

The head of the ear piercing gun holds the ear ring studs and the trigger motion forces the stud into and through the tissue of the ear lobes.

III Infection Prevention during Ear/Body Piercing

The practitioner should follow the recommendations below in order to prevent infection during the procedure.

1. The Ear Piercing Gun

If an ear piercing gun is to be used, one with a disposable sterile cartridge that holds the studs is highly recommended. The disposable cartridge is removed after the piercing of ears, and the remainder of the gun must be wiped with 70% alcohol between clients. Wiping the gun reduces the likelihood that the practitioner will contaminate the new sterile cartridge. Use of the new sterile cartridge greatly reduces the chances of infecting the next client.

Many shops use ear piercing guns with a solid head (no disposable sterile cartridge) creating cleaning and disinfection difficulties that increase the risk of transmitting infection. The solid head has crevices that are difficult to clean, and disinfection involves immersing the entire gun in a high level disinfectant, e.g. 2% gluteraldehyde, for a period of time, as indicated in the manufacturer s instructions. Failure to use the high level disinfectant after one client could expose the next one to a BBP[4,5]. Because of possible toxic effects to the practitioner when using gluteraldehyde, e.g. vapours, the product must be used carefully. Refer to the material safety data sheet (MSDS) and follow the manufacturer s written instructions.

The ear piercing gun should be used only for piercing the fleshy part of the ear lobes. The gun is not suitable for piercing other parts of the body such as the navel, the nasal cartilage, or the cartilage areas of the ear. The action of the ear piercing gun can damage tissue and create a risk for later infection (please refer to Part 3: Literature Review for complications of piercing with the ear piercing gun).

2. Skin Piercing Needles

Pre-sterilized single-use needles should be used for each client. The gauge of needle depends on the size of the Jewelry to be inserted and the piercing site. If the needle is contaminated before or during use, it must be replaced by another sterile needle.

3. Jewelry

Jewelry that is used during skin piercing should be smoothly polished and designed to permit easy cleaning, which is essential to achieve sterilization. Most Jewelry is purchased commercially in the form of studs, hoops, or barbell-shaped devices. The most suitable types of metal used in skin piercing include 14-18 carat gold, titanium, surgical steel (316-L) or niobium, as these can be effectively sterilized. The use of other metals or alloys increases the risk of allergic reactions to the insert, e.g. nickel alloy has produced nickel sensitivity, and the client should be advised against using this if she/he has a known sensitivity.

4. Healing of Pierced Area

The prolonged healing time needed after body piercing increases the risk of infection to the open tissue area. Healing of tissue that has been pierced with Jewelry in place varies according to factors such as the movement of the body part, e.g. tongue, the Jewelry itself, the quality of the procedure, and care of the piercing site by the client. The ear cartilage piercings take longer to heal than those of the ear lobe. Jewelry that is smoothly polished and designed to permit easy cleaning after insertion is very helpful. The healing time for piercing is six months to one year, depending on the site, health of the client, and after care.

5. Equipment and Supplies

The following equipment will be required by the practitioner to carry out safe skin piercing. Supplies used for skin piercing are obtained from specialty supply shops and medical supply outlets.

- Sterilizer (steam or dry heat)
- Instrument packaging
- Heat indicator strip for testing each load
- Bacterial spore test strips
- Metal tray
- Instrument container(s)
- Sharps container
- Client treatment table and chair
- Hand soap
- Needle (hollow)
- Forceps
- Tongue depressor
- Calipers
- Jewelry
- Insertion taper
- Receiving tube
- Ring opening pliers
- Ring closing pliers

Hand lotion
Toothpicks and ink
Medical gloves
Lubricant
Ointment
Detergent
Disinfectant (low and high level)
Antiseptic
Ear piercing gun (optional)
Ultrasonic cleaning device
Waste bin (plastic-lined) with lid
Small cleaning brush

Barbell connector
Needle pusher (plastic)
Cork
Cotton swabs or gauze
Cotton tipped applicators
Elastics
Towels (single use)
Flashlight or transdermal illuminator
Antibacterial mouthwash
Disposable paper cups
Cleaning brush for receiving tube/needle
Eye dropper

6. Preparing the Work Area and the Client for Ear/Body Piercing

Before carrying out the actual piercing procedure, the practitioner should ensure that both the client and all equipment and supplies to be used are prepared in a suitable manner.

a. Position the client comfortably.

b. The skin/tissue should be assessed before each skin piercing procedure. If any skin/tissue abnormalities exist, the piercing procedure should not be performed.

c. Ensure that the work area is large enough to arrange all the equipment that is needed.

d. A plastic-lined waste bin and a sharps container should be placed within easy reach of the practitioner in the service area.

e. The practitioner should wash his or her hands thoroughly. A clean drape, e.g. towel, may be used to drape the area of the body next to the skin piercing site to help protect against soiling.

f. Clean, disinfected, and sterile items from the supply cupboard should be used for the procedure. A clean, disinfected tray covered with a clean single-use towel should be placed on a surface in the client service area and positioned conveniently for the practitioner. Clean items, e.g. elastic bands or cotton swabs, stored in bulk containers should be removed with clean forceps to avoid contamination of items in the container. Packages containing sterile items should be opened but their contents not removed at this time. Lubricant may be contained in a single-use package, a bulk container with lid or a squeeze tube. If a bulk container is used, the lubricant should be removed with a single-use spatula, e.g. tongue depressor.

Clean swabs should be placed on the service tray and the antiseptic should be available.

g. Antiseptic should be pumped (using a pump pack) on a cotton swab that is used to disinfect the skin area to be pierced. Special procedures should be used as an antiseptic for tongue piercing, e.g. antibacterial mouth-wash.

h. The practitioner should wear gloves to avoid contact with mucous membranes when the skin antiseptic is applied, e.g. to the nasal, oral, or genital area.

i. If measuring the skin piercing site is necessary, use clean calipers and mark using clean toothpicks and ink, e.g. gentian violet.

j. A small flashlight or transdermal illuminator may be used to illuminate skin/tissue and avoid piercing blood vessels in certain areas of the body, e.g. the scrotum or ear cartilage. The flashlight or illuminator should be covered with a plastic sheath prior to use. Following use for one client, the flashlight or illuminator should be cleaned and disinfected with a low level disinfectant.

k. After preparing the site to be pierced, i.e. measuring, marking, and cleaning with antiseptic, the practitioner should remove the gloves, wash hands well, and should put on a new pair of gloves for the piercing procedure.

l. All sterile items for the piercing procedure should be left in their package(s) on the service tray so that they can be accessed without any surfaces outside the package being touched.

m. It is good practice to open the package containing the sterile needles in front of the client. Never handle the needles more than is necessary.

n. When the treatment is finished, the needles should be put in the sharps container in front of the client.

7. Detailed Infection Prevention and Control Procedures for Ear/Body Piercing

Table 6 provides a list of equipment and supplies, their use during ear/body piercing, and a practical method of applying infection control principles, which should be followed unless the manufacturer provides written instructions stating otherwise.

Table 6
Detailed Infection Prevention and Control Procedures for Ear/Body Piercing

	Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
1.	Client preparation:		
	single use towel	A towel may be used to drape the piercing site.	The towel should be used to protect the client from any soiling during the procedure.
2.	Skin preparation:		
	skin antiseptic, e.g. 70% alcohol or an iodine, e.g. betadine. The antiseptic selected should be appropriate for the piercing site according to the manufacturer s instructions, e.g. 70% alcohol is suitable for application to skin but should not be used on mucous membranes.	Swabs moistened with an antiseptic are used to disinfect the skin piercing sites.	The skin antiseptic should be applied with a moist swab, using a circular motion. If alcohol is used it should be stored in a pump pack which is used to moisten the swab with alcohol. Other antiseptics, e.g. betadine, may be poured into a disposable cup. If betadine is used to prepare the skin before genital piercing, any excess antiseptic should be removed to avoid irritation to mucous membranes.
	clean swabs, e.g. gauze or cotton balls	Warm water or PCMX[d] is used to cleanse areas around the eyes.	
	antibacterial mouth wash	Mouthwash is used as an antiseptic before piercing the tongue.	Antibacterial mouthwash cleans the mouth prior to tongue piercing if used for several minutes.
3.	Skin marking:		
	calipers	Calipers are used to measure skin piercing sites to create a symmetrical appearance.	Calipers should be cleaned with low level disinfectant if the skin is intact. Calipers used on mucous membranes should be disinfected with high level disinfectant, e.g. 6% hydrogen peroxide, or sterilization should be carried out.

[d] PCMX = Para-chloro-meta-xylenol

	Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
	tooth picks and ink, e.g. gentian violet	Tooth picks, dipped in ink mark the piercing site(s).	A few drops of ink should be placed on a clean surface, e.g. the inner surface of the wrapper used for a sterilized item, to avoid dipping the tooth pick into the ink container itself. Marking pens should ***not*** be used on more than one client because these pens cannot be cleaned.
	forceps	Forceps should be used to hold the marked skin taut for the needle piercing. They may become contaminated with blood during the procedure.	Forceps should be cleaned and sterilized after use on each client.
	elastic bands	Elastic bands are used to hold the handles of the forceps closed to ensure secure gripping of the skin surface.	Clean elastic bands should be stored in a covered container and discarded after use. Forceps should be used to remove the elastics from the container at the outset of the procedure to avoid contamination of other elastic bands in the container.
4.	Service tray: a tray that is smooth, nonporous and easy to clean, e.g. metal	The tray is covered with a clean towel. Sterile instruments and other supplies, e.g. lubricant, cork, elastic bands, and any additional required items should be placed on the towel. The sterile needle, Jewelry, and forceps should be left in the opened packages until just before use. The tip of the needle should not be touched prior to insertion.	The tray should be cleaned with a low level disinfectant after use. The towel should be a single use disposable or freshly laundered cloth.
5.	Instruments: single use hollow skin piercing needles, e.g. stainless steel	The needle pierces the skin/tissue and the Jewelry is inserted in the channel created by the needle.	One new, sterilized piercing needle should be used for each client **and** each procedure. The needle should be discarded into the sharps container after use.

Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
needle pushers (plastic)	The practitioner may use needle pushers to push the blunt end of the needle through tissue.	Needle pushers should undergo high level disinfection because of contact with the sterile needle that will be inserted through skin/tissue.
insertion tapers	Insertion tapers are most often used to upgauge or put in a thicker piece of Jewelry into already healed piercings.	Insertion tapers should be cleaned and sterilized after use on each client.
connectors (solid metal)	Connectors are used to facilitate the insertion of internally threaded barbells by providing a link between the hollow needle and the hollow Jewelry.	Specialized connectors should be cleaned with small brushes in a solution of detergent and water and sterilized after use on each client.
receiving tubes	Receiving tubes are used when piercing difficult-to-reach areas, such as the nostril or the glans of the penis. The tube forms a drum of skin into which the piercing needle is received.	Receiving tubes should be cleaned and sterilized after use on one client. The receiving tube prevents tissue injury at the exit point of the piercing needle, e.g. the wall of the urethra, or the inside of the nostril, but the needle continues through and does not recede into the pierced tissue.
corks (single use)	Corks are used to cover the sharp end of the needle after it has pierced through tissue to prevent a needlestick injury to the practitioner.	Clean, single use corks should be discarded after one piercing. It is not necessary to sterilize the cork as it does not come in contact with open skin areas. The needle tip, which is inserted into the cork, should not be pulled back through the freshly pierced tissue. Instead, the cork and needle should be placed in the sharps container.

	Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
6.	Ear piercing gun:		
	single use pre-packaged stud and butterfly clasp	The stud is pierced through the lobe of the ear by the spring mechanism in the gun or squeezing the gun by the practitioner, and the butterfly clasp at the back of the ear lobe holds the stud in place.	Studs should be sterile and prepackaged.
	head of gun A single use removable cartridge is strongly recommended.	The gun is used to hold the sterile stud. Blood may be splattered onto the gun as the stud is pierced through ear tissue.	The removable cartridge should be discarded after use. The gun surface should be wiped with an intermediate level disinfectant, e.g. 70% alcohol, between clients.
	If a gun with a solid head, i.e. no sterile, removable cartridge, is used special disinfection procedures should be followed.		Guns with a solid head should be cleaned using a small brush followed by high level disinfection after each client. Because the head is not removable the entire gun must be soaked in a high level disinfectant, e.g. gluteraldehyde or 6% hydrogen peroxide, for a specified length of time as recommended in the manufacturer s product instructions.
7.	Jewelry :		
	rings, studs, and barbells are common forms the composition of Jewelry is primarily 14-18 carat gold, titanium, niobium or surgical steel (some steel contains nickel)	Sterile Jewelry is inserted through the needle channel and secured.	Jewelry must be sterilized before use. Jewelry should be smooth to avoid skin irritation, which delays healing and increases infection risk.
	ring opening pliers ring closing pliers	Sterile ring pliers should be used to open and close Jewelry, taking care not to scratch or nick the metal.	Pliers should be cleaned and sterilized after each use.

	Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
8.	Additional supplies:		
	container, e.g. metal, with lid cool water and detergent	The container is used to store used instruments prior to cleaning. Soaking instruments prevents drying of body proteins.	The container should be cleaned daily and then subjected to low level disinfection. The solution in the container should be changed daily.
9.	Disinfectants:		
	low level, e.g. quaternary ammonium compounds	Low level disinfectants are used to remove pathogens from work surfaces.	Low level disinfectants should be used to disinfect noncritical items, e.g. service tray. The disinfectant should be prepared and used according to manufacturers directions.
	intermediate level, e.g. 5.25% household bleach	Intermediate level disinfectants are used to remove pathogens from work surfaces/equipment.	Intermediate level disinfectants, e.g. bleach and water solution (1 part bleach and 9 parts water), may be used in place of a low level disinfectant to disinfect work surfaces and equipment.
	high level, e.g. 2% gluteraldehyde or 6% hydrogen peroxide	High level disinfectants are used to disinfect semicritical items that are in contact with sterile critical items.	The ear piercing gun and plastic needle pusher should be cleaned and soaked in a high level disinfectant after use on each client (as described in #6)
10.	Sterilization equipment and supplies:		
	sterilizer e.g. steam autoclave	Sterilization kills all microorganisms. The sterilizer is usually kept in the dirty zone.	Steam autoclave or dry heat should be used for sterilization. Steam is the preferred method.
	paper, plastic pouches or other packaging appropriate for sterilization	Use to package instruments prior to sterilization.	Items should be packaged to maintain sterility of sterile items under recommended storage conditions, e.g. in areas that are free from moisture.
	chemical indicators indicator strips that change with heat and moisture for each load	Heat indicator tape or heat indicator bags should be used with each load that is placed in the sterilizer.	A change in colour indicates that the steam and heat level has been reached.

	Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
	spore test strips or vials	The spore test is used to monitor that the sterilizer has killed all microorganisms.	The spore test should be sent to the laboratory once a month to verify that the sterilizer is working properly.
11.	Sharps container with secure lid	For the disposal of piercing needles and cork.	Puncture-resistant sharps containers should be used to help prevent sharps injuries.
12.	Client after care:		
	antibacterial soap	Clients should be instructed to wash their hands before washing the pierced area with an antibacterial soap on a daily basis and to rotate the Jewelry to help with the cleaning process.	The skin piercing site should be cleaned to promote healing and prevent the chance of infection. Oral and written instructions for aftercare should be provided to the client.
	antibacterial ointment	Ointment may be applied to the freshly pierced skin area and the Jewelry should be rotated.	If ointment is used, single use ointment applications are recommended. Ointment also acts as a lubricant and may reduce the chance of infection. If ointment is taken from a bulk container it should be removed with a single use spatula or tongue depressor. Some people develop an allergic reaction to the ointment, and so some practitioners do not use it.
13.	Practitioner supplies:		
	hand washing soap hand lotion	Soap is used to clean the practitioner s hands of microorganisms picked up at work. Lotions are used to keep the skin in good condition as frequent hand washing may dry out the skin.	Refer to recommendations in Part 1: the Umbrella Document.

Equipment/ Supplies	Use During Skin Piercing	Procedures for Infection Prevention
clean medical gloves, e.g. latex ,vinyl, neoprene, or nitrile	Gloves should be used as a protective barrier on hands after cleaning of the skin with an antiseptic and opening the package that contains the sterile needle. Gloves or forceps should be used to remove the needle from the package. If the gloves are contaminated, they should be removed and a new pair put on.	Gloves should be worn to reduce the number of organisms on the hands and offer some protection from sharps injuries. Gloves should be used to touch only the objects needed to do the procedure. Hands should be washed before gloves are put on and following glove removal.

For the health and safety of the practitioner, please see Part 1: the Umbrella Document.

Guidelines for Infection Prevention and Control in Electrolysis

I Introduction

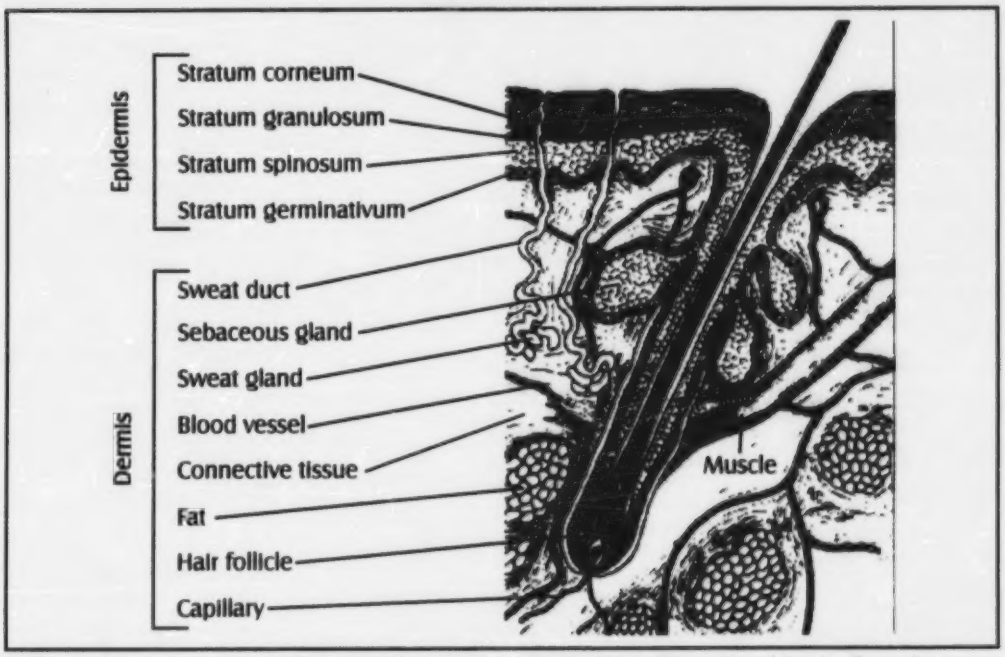
Electrolysis or electroepilation has been reported as the source of only a small number of infections in the literature (see Part 3: Literature Review). However, the potential for infection exists if the needle is contaminated when it enters the hair follicle. The specialized, solid needles used during electrolysis can become contaminated with microorganisms from the client s skin and from material in the hair follicles. The needles may also puncture the base of the hair follicle and become contaminated with blood. Other instruments that may become contaminated with pathogens include the hypodermic needle or any tool used to remove ingrown hair. Equipment at risk of contamination during electrolysis includes the needle holder components, forceps, tweezers, magnifier lamp, or a portion of the cord in direct contact with the client and leading to the epilator, and any environmental surfaces touched by the practitioner.

Electrolysis needles normally enter the natural hair follicle but may pierce tissue beneath the skin. Therefore, the needles must be sterile at the beginning of each procedure and discarded after each treatment session. Using sterile needles during each treatment session reduces the chance of needle contamination with pathogens that are foreign to the client, i.e. from another client, from the practitioner, or from a previous session with the same client. The infection prevention guidelines for electrolysis are aimed primarily at reducing the risk of contamination of the sterile needle with pathogens from another person or from a previous session with the same client.

II What Is Electrolysis?

Electrolysis is the only proven method, to date, of permanent hair removal. Hair can safely be removed from most skin surfaces on the body except for special areas such as the inner ear and nostril. Common treatment areas for electrolysis include the upper lip, eye brows, chin, the breasts, armpits, hypogastric area, thighs, legs, and the area that borders the pubic area. During electrolysis an electric current is conducted through a needle that has been inserted into the hair follicle, destroying hair growth cells in the target area. The target area is the zone within the follicle from the papilla (base of the hair follicle) to the sebaceous gland. Hair growth cells are located in the dermis and subcutaneous layers, close to the capillary. The electrolysis needle is placed parallel to the hair in the follicle.

Figure 2
Diagram of a Cross-Section of Human Skin



* Copyright permission to reprint figure 18-1 has been obtained from *Casarett and Doull s Toxicology: Basic Science of Poisons*. 5th ed. Toronto, ON: McGraw-Hill, 1996:530.

The specialized solid needle used in electrolysis has a very small diameter, and if severely bent, may break off in the skin or cause burning on the skin surface. Electrolysis is achieved by three main methods:

1. Galvanic Method

A direct current (DC) is sent through the needle, which reacts with tissue saline (salt and water) to create sodium hydroxide (lye). The lye chemically destroys the follicle and hair growth cells in the target area. This method of electrolysis is very effective but slow (requiring a minute or more for each hair).

2. Thermolysis Method (the Flash Method)

An alternating current (AC), also known as diathermy, short wave or high radio frequency current creates friction in the follicle surrounding the needle, and this causes the tissue to coagulate or desiccates the tissue and hair growth cells. This method seems to be the most commonly used method of permanent hair removal.

3. Blend Method

This is a combination of the first two methods. Each current enhances the effects of the other to destroy the follicle and hair growth cells in the target area. The blend method is popular among electrologists (person who performs electrolysis) as it achieves the thoroughness of the galvanic method with the speed of thermolysis.

The electrolysis procedure requires many rapid, repetitive and manually dexterous motions involving skilled and accurate needle insertion into the hair follicle. Factors that affect safe and permanent hair removal are skin moisture content, intensity and length of current, size of needle used, type and stage of hair growth, and the education and experience of the practitioner. Other facts about electrolysis follow:

- The electrolysis needle is held in place by the pin device. The pin device forms the distal end of the epilator cord that conducts electric current from the electrolysis machine to the electrolysis needle. All pin devices are covered with a plastic cap or screw-on needle holder tip.
- During electrolysis the needle may puncture tissue beneath the skin. Ingrown hairs and distorted hair follicles increase the number of tissue punctures outside the hair follicle, and these may cause bleeding to the skin surface. Many ingrown hair follicles may be infected.
- Some swelling of tissue following electrolysis is normal and usually disappears in several hours. Bruising and skin crusting may occur. Superficial skin burns are due to poor technique.

III Laser Hair Removal

Laser (Light Amplification by Stimulated Emission of Radiation) removal is a new method of hair removal, not a type of electrolysis, that cannot claim permanent results. Different types of laser are available that seek melanin in the hair shaft. Melanin content is highest during the growth phase of the hair follicle. We are unable to provide recommendations for the selection of patients, potential complications, qualifications of the practitioners, or safety training of the practitioners[19-21].

IV Infection Prevention for Electrolysis

The critical items for infection risk during electrolysis are the electrolysis needle, the forceps used to hold the hair, and the hypodermic needle that should be used to lift or remove ingrown hairs. Each of these three items enters the deep layers of the skin and therefore is classified as a critical item that must be sterilized.

The pin device and needle holder tip are classified as semi-critical items because they hold or have direct contact with the sterile electrolysis needle[6]. Reusable semi-critical items must undergo high level disinfection. The availability of a

single-use combination unit (needle and needle holder tip/cap) eliminates the need to disinfect the needle tip holder. Disposing of both the needle and the cap reduces the risk of transmitting BBPs.

1. Equipment and Supplies

The list that follows includes equipment and supplies commonly used by practitioners. Supplies used during electrolysis are obtained primarily from electrolysis and medical supply outlets. The items may vary according to the practitioner s preference and the method of electrolysis performed.

Equipment	Client supplies	Practitioner (electrologist) supplies
Epilator (electrolysis machine)	Drapes/towels	Hand soap
Epilator cords	Swabs (cotton balls or gauze)	Hand lotion
Light source (e.g. lamp)	Cotton lip rolls	Medical gloves
Magnifying lamp/glasses	Skin antiseptic	Masks (optional)
Microscope	Eye shields	
Sponge holder and cord	Topical anesthetic	
Needle holder and parts	Electrolysis needles	
Needle holder tip (plastic)	Forceps	
Sterilizer (steam or dry heat)	Scissors (optional)	
Instrument container(s)	Detergent	
Metal or glass procedure tray	Disinfectants	
Sharps container	Hypodermic needles	
Client treatment table/chair	Paper tissues	
Practitioner chair	Cotton tipped applicators	
Ultrasonic cleaning device	Wet sponge pad or conductive gel pad	
Heat indicator strip for testing each load in the sterilizer	Pipe cleaners	
Metal container with lid	Pump pack for antiseptic	
Clock timer	After care supplies	
Client pillows		
Spore test strips		
Packaging for sterile items		

2. Preparing the Work Area and the Client for Electrolysis

All items used during electrolysis should be assembled in a clean environment. Cross contamination of sterile items (electrolysis needle, forceps, and hypodermic needle) should be avoided by keeping these items from touching contami-

nated surfaces or equipment or the practitioner s hands. Ensure that the work area is large enough to accommodate all the equipment needed. A suggested routine for preparation of the electrolysis procedure follows:

a. The client is comfortably positioned and the skin should be evaluated before each treatment. If any infectious skin abnormalities exist near the treatment site, e.g. cold sore lesions, the treatment should be postponed. A clean towel should be used to drape the area near the treatment site.

b. A movable trolley or cart, which is used in the treatment service area, should contain all items that will be used during the procedure, including the epilator and all its parts, medical gloves, paper tissues and a readily available supply of sterile supplies, e.g. electrolysis needles, forceps.

c. A plastic-lined waste bin should be placed within reach of the practitioner.

d. A sharps container and materials for skin preparation (skin antiseptic, pump pack for dispensing the antiseptic, unsterile dry swabs or pre-packaged sterile antiseptic swabs) should be placed on the movable work station, e.g. trolley or cart.

e. The practitioner should wash his/her hands thoroughly.

f. A clean, disinfected service tray is placed on a trolley or cart. The tray should be used to hold the opened packages containing the sterile, single-use electrolysis needle, forceps, and hypodermic needle. The inside of the package keeps items sterile until just prior to use.

g. It is good practice to open packages containing the sterile disposable needle(s) in front of the client, just before the treatment.

h. A clean, disinfected, reusable needle holder tip should be removed from a clean container onto the service tray using clean forceps. Alternatively, a sterile, single-use combination unit, consisting of an electrolysis needle permanently attached to a plastic cap, may be used. A special adapter connects the combination unit to the pin device. It is preferable that the needle holder tip be single use/disposable.

i. Based on the evidence in the literature and on submissions from the three electrolysis associations*, the steering committee responsible for all infection control guidelines in LCDC has recently judged the risk to electrologists (working for extended periods in small areas with solid bore needles) to be equivalent to health care workers giving injections with a hollow bore needle. To that end, the recommendations are that gloves should be worn when hand contamination with blood is anticipated, when working on an infected hair follicle, and when there are cuts or breaks in

* Canadian Organization of Professional Electrologists, Federation of Canadian Electrolysis Associations, and Association des électrolystes du Québec Inc.

the skin of the practitioner. This recommendation is parallel to that of other professions at this level of risk.

j. The reusable, plastic needle holder tip should be loosely screwed onto the needle holder. The sterile forceps are then used to insert the sterile electrolysis needle, which has been removed from the sterile package, into the metal pin device. The plastic needle holder tip is then tightened.

k. The needle holding cord with attached needle should be suspended on equipment or the practitioner s neck. Care must be taken not to contaminate the electrolysis needle, e.g. by contact with the practitioner s clothing.

l. The magnifying lamp/glasses or microscope is positioned for use during the procedure. Care should be taken not to contaminate the gloves.

m. The hypodermic needle and the electrolysis needle are disposed of in the sharps container in front of the client when the procedure is over.

3. Detailed Infection Prevention and Control Procedures for Electrolysis

Table 7 provides a list of equipment and supplies, their use during electrolysis, and a practical method of applying infection control procedures, which should be followed unless the manufacturer s written instructions state otherwise.

Table 7
Detailed Infection Prevention and Control Procedures for Electrolysis

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
1.	Client preparation:		
	towel, e.g. single-use paper or laundered cloth	Drape the towel around electrolysis treatment area of the client.	The towel offers added protection for supplies and equipment that may touch surfaces near the treatment area, e.g. the client s clothes.
	eye shields	Protect client eyes from injury and lamp glare during electrolysis involving the face.	Detergent and water should be used to clean the eye shields, followed by low level disinfection, after each client use.
	wet sponge pad with holder (the metal electrode or conductive gel pad is held in the client s hands)	Completes the electrical circuit in the galvanic/blend (not thermolysis) method.	The sponge pad should be cleaned in detergent and water after client use. The single-use conductive gel pad should be discarded after use.

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
	dental lip rolls	Lip rolls may be used to create a taut skin surface for electrolysis, e.g. the upper lip.	Dental lip rolls should be discarded after each use.
2.	Skin preparation:		
	skin antiseptic, e.g. 70% alcohol clean swabs, e.g. cotton balls, gauze or cotton applicators pump pack containing the antiseptic topical anesthetic (optional)	A non-irritating antiseptic is used to disinfect the skin before electrolysis. A topical anesthetic may be used to decrease client discomfort during electrolysis.	Antiseptic should be applied to the clean swab using a pump pack. Pre-packaged antiseptic swabs may be used. Care should be taken to avoid the antiseptic coming into contact with the eyes and mouth during electrolysis. Cotton applicators moistened with water may be used to clean the treatment area near the eyes. Anesthetic swabs should be discarded after each use.
3.	Epilator:		
	client sponge holder cord needle holder and cord button/knob controls	Conducts the electric current for electrolysis. Button/knobs are to control current intensity and times.	The epilator button/knob controls and cord should be cleaned and wiped with a low level disinfectant after each client service or could be covered with single-use plastic.
4.	Magnifying lamp and the arm holding it/glasses or microscope and light source, e.g. lamp	Permits visualization of the treatment area.	Equipment surfaces touched by the practitioner should be cleaned and disinfected with a low level disinfectant after each client.
5.	Instruments:		
	electrolysis needle or needle and cap combination unit	An electric current is passed through a specialized needle that has been inserted into the hair follicle.	Prepackaged sterile, single-use, solid needles or a combination unit (sterile needle permanently attached to the plastic cap) should be used. Needles must not be reused for future treatments on the same client. Used electrolysis needles should be discarded into a sharps container.

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
	hypodermic needle	The hypodermic needle should be used to lift or remove ingrown hairs.	Sterile, single-use hypodermic needles should be used to lift or remove ingrown hairs and should be discarded into the sharps container after use on each client. This procedure breaks the skin tissue and usually draws some blood, therefore the electrologist should wear gloves.
	forceps	Forceps should be used to lift and hold the hair during electrolysis and may be used to lift ingrown hair.	Forceps should be sterile. Forceps should be cleaned and packaged before sterilization.
	scissors	Scissors may be used to cut hair before electrolysis.	Scissors should be cleaned and disinfected with an intermediate level disinfectant after each client service.
6.	Needle holder:		
	metal pin device	The electrolysis needle is inserted or screwed into the prongs of the metal pin device.	The permanently attached pin device should be cleaned and wiped with an intermediate level disinfectant, e.g. 70% alcohol, after each client service.
	reusable plastic needle holder tip or single-use combination unit, i.e. needle and needle holder tip or cap in one unit	The reusable, plastic needle holder tip that is screwed on, or the cap of the single-use combination unit, covers the pin device to prevent electric shocks to the practitioner.	The reusable, screw-on, plastic needle holder tip should be cleaned with a pipe cleaner after each client service and should be disinfected with a high level disinfectant, e.g. 6% hydrogen peroxide, and stored dry. If a single-use combination unit is used, the needle should not be recapped prior to disposal to reduce the risk of needle injury to the practitioner, or should be recapped using only one hand to place the needle in the sheath.

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
7.	Additional supplies:		
	tray, e.g. metal or glass	Rest instruments/supplies on the tray during the procedure.	Trays should be cleaned and disinfected (low level disinfectant) after each client service.
	container with lid (containing water or detergent and water)	Used instruments are stored in water or a detergent and water solution to prevent drying of body proteins prior to cleaning.	The dirty instrument container should be cleaned daily and then subjected to low level disinfection. The solution in the container should be changed daily.
	ultrasonic cleaning device	An ultrasonic device that contains detergent and water may be used to clean instruments.	The ultrasonic cleaning device should be cleaned daily with detergent and water. A fresh solution of detergent and water should be placed in the device each day. The ultrasound device **does not sterilize** the instruments.
8.	Disinfectants:		
	low level	To remove pathogens from work surfaces and equipment.	Low level disinfectants should be used to clean non-critical items, e.g. epilator control buttons.
	intermediate level, e.g. 70% isopropyl alcohol	To remove pathogens from a semicritical item that cannot be soaked, i.e. the pin device that holds the sterile electrolysis needle.	Intermediate level disinfectants should be used to disinfect the cleaned pin device.
	high level, e.g. gluteraldehyde or 6% hydrogen peroxide	High level disinfectants are used to disinfect semicritical items that can be soaked, e.g. the reusable, plastic needle holder tip.	The cleaned, reusable needle holder tip should undergo high level disinfection for the time indicated in the manufacturer s instructions, and it should be stored dry.
9.	Sterilization equipment and supplies:		
	sterilizer (steam autoclave or dry heat sterilizer)	The sterilizer is used to kill microorganisms. The sterilizer is usually kept in the dirty zone.	Steam or dry heat should be used to sterilize critical items that may come into contact with the client s bloodstream. Needles should be purchased sterile.

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
	packaging for instruments, e.g. paper, plastic pouches, or metal container with lid	Clean instruments, e.g. forceps, are packaged prior to sterilization.	Sterilized items should be kept in the clean zone of the shop.
	chemical indicators heat indicator strips that change colour with heat and moisture for each load	Heat indicator tape or heat indicator bags should be used with each load that is placed in the sterilizer.	A change in colour indicates that the steam and heat level has been reached.
	spore test strips or vials	The spore test should be performed at least once every month to monitor the effectiveness.	The spore test confirms that the sterilizer kills all microorganisms.
10.	Sharps container	Electrolysis needles should be discarded into sharps containers.	Puncture-resistant sharps containers should be used to help prevent accidental needle injuries.
11.	Client aftercare:		
	skin antiseptic swabs, e.g. cotton balls or gauze	Antiseptic cleanses the skin.	Antiseptic should be applied with a clean swab from a pump pack containing antiseptic or pre-packaged single-use antiseptic swabs.
	ointment or mild astringent, e.g. witch hazel	Ointment/astringent may be used to soothe the skin and promote skin healing.	A swab or hands with new, clean gloves should be used to apply ointment or astringent. A single-use wooden tongue depressor or spatula should be used to remove ointment from a bulk container to apply to the skin. The spatula should be discarded into a waste bin. Clients should be instructed to avoid touching the skin that has undergone electrolysis or touch only with washed hands. The client should avoid using make-up according to the practitioner s advice.

	Equipment/Supplies	Use During Electrolysis	Procedures for Infection Prevention
12.	Practitioner supplies:		
	hand washing soap hand lotion	Soap is used to clean micro-organisms from the practitioner s hands. Lotions are used to keep the skin in good condition.	Refer to recommendations in the Umbrella Document.
	new medical gloves	Gloves should be worn when hand contamination with blood is anticipated, when working on an infected hair follicle, or if the practitioner has cuts or other breaks in the skin.	Medical gloves should be worn for all procedures that might involve skin or mucous membrane contact with blood or fluid capable of transmitting BBPs. Gloves reduce the number of microorganisms on the hands and offer some protection from sharps injuries. Hands should be washed before gloves are worn and after glove removal. Cuts/breaks in the skin should be covered with a waterproof dressing before the gloves are worn.
	single-use masks (optional)	The practitioner may wear masks if he or she has an upper respiratory infection.	Masks may help prevent the transmission of pathogens between the practitioner and the client, e.g. during upper respiratory infections.

For the health and safety of the practitioner, please see Part 1: the Umbrella Document

Part 3

Literature Review for Tattooing, Ear/Body Piercing and Electrolysis

I Introduction

A systematic literature search was conducted between October 1997 and March 1998 employing the following health literature databases:

Medline (1966-present)
Cinahl (1982-present)
Embase (1991-present)
HealthStar (1975-present)

The following search terms were used in the search: tattoo, tattoos, tattooed, tattooing, ear piercing, body piercing, tongue piercing, nipple piercing, genital piercing, electrolysis, electrology, electroepilation, thermolysis, hair removal (cross-referenced with hepatitis B, hepatitis C, HIV, bloodborne pathogens, infection control, meta-analysis, quantitative review, systematic review, methodologic review, quantitative overview, systematic overview, methodological overview, review). Books on the topic were also located (University of Alberta library database).

Canadian infection control guidelines that pertain to tattooing, skin piercing and/or electrolysis were requested from all provincial chief medical officers of health. Guidelines from the UK, Australia, New Zealand and the United States were also obtained.

The literature for each of the three personal care services was grouped into one of the following six categories: descriptive, infection risk, non-infection risk, case-control, epidemiology, review. A summary of the literature for each procedure is outlined below.

II Summary of the Literature for Tattooing

1. Frequency in the Population

Tattooing has been practised since ancient times; archaeological evidence dates tattooing to as early as 2000 B.C.[22]. Today, it is estimated that there are between 7 and 20 million tattooed individuals and 4,000 tattoo studios in the United States[23]. Between 1960 and 1980, the number of U.S. women tattooed has quadrupled, with 50,000 to 100,000 women being tattooed yearly, nearly half of all tattooing procedures in that nation[11]. No other studies reporting the frequency of tattooing in the general population were found. However, tattooing is a common practice among inmates in correctional institutions, according to findings in epidemiologic literature on bloodborne pathogens from several countries. Thirty percent of prisoners (Norway)[24], 34% of male prisoners with hepatitis B or 25% of all male prisoners (Italy)[25] and 47% of male prisoners/53% of female prisoners (Canada)[10] were found to be tattooed in the groups studied. A 1992 survey of 450 randomly sampled British soldiers found that 44% had been tattooed[26].

2. Infectious Risk

a. Case Reports

Tattooing has been reported as the source of infection for several documented single case reports or outbreaks of disease. Hepatitis B was the most common infection acquired as a result of tattooing[27-30]; two hepatitis C case reports also implicated tattooing as the source[31,32].

Warts (verruca[33], verruca plana[34] and verruca vulgaris[35]) have also reportedly been spread by tattooing. Cases of toxic shock syndrome[36], cutaneous tuberculosis[37], inoculation leprosy[38] and *Molluscum contagiosum*[39] are other diseases of which tattooing has been implicated as the source.

b. Epidemiologic Studies

Evidence that tattooing is a risk factor for acquiring bloodborne pathogens (hepatitis B, hepatitis C, HIV) is most often reported through sero-epidemiologic studies. Studies from several different countries have reported tattooing as a significant risk factor for hepatitis B: Australia[40-42], Brunei[43], Italy[44], Japan[45], New Zealand[46], Singapore[47], Sudan[48] and Taiwan[49], whereas one Canadian study concluded that tattooing was not a statistically significant risk factor for HBV[50]. As well, studies on hepatitis B in prison populations have reported tattooing as both a significant risk factor[12,51], and an insignificant risk[25].

Tattooing was shown to be a significant risk factor for hepatitis C infection in studies (some of which were case-control studies) from several nations, including Australia[52], Japan[45], Spain[53,54], Sweden[55], Taiwan[56], United

Kingdom[57,58] and the United States[59]. Other studies simply included the proportions of groups of individuals with either HBV[60,61] or HCV[62-68] who had been tattooed, but the significance of the proportion tattooed was not reported. A study of prison inmates in British Columbia reported tattooing as not being associated with an increased risk for HCV[12] whereas a study at a Norwegian prison showed tattooing to be a significant risk factor for HCV[24]. A Quebec study of an inmate population reported that HIV infection in the study group was not associated with tattooing in either men or women[10].

Despite the findings of these studies, Shikomura and Gully[69], in a review of the literature of risk of HCV from tattooing and other skin-piercing services, concluded that there are important limitations in the epidemiologic literature on tattooing and risk of HCV. These limitations can also be extrapolated to epidemiologic literature regarding tattooing and HBV. Limitations include:

i. Risk of tattooing was often not the central focus of the studies.

ii. Risk factors including tattooing, drug use and others were often self-reported.

iii. Few studies centred on Canadian populations.

iv. It was not determined whether tattooing occurred before or after the bloodborne infection.

However, an Australian study of tattooists exposure to HBV and HCV reported that 48.6% of the tattooists studied were positive for HBV markers, whereas only 5.6% were positive for HCV antibody[70]. Although this study may also be subject to some of the limitations listed, it may give an indication as to the risk of HBV and HCV infection from tattooing in 1984.

c. Literature Reviews

Reviews of older literature (pre-1975) report tattooing as the cause of several types of infections, including those already mentioned, as well as syphilis, rubella, chancroid, tetanus, vaccinia, herpes simplex and zoster[71-73].

3. Non-Infectious Risk

a. Case Reports

Case reports of non-infectious complications arising from tattooing are frequently seen in the literature. The most commonly reported complication is cutaneous reaction to tattoo pigments, including inflammatory reactions[74-76], erythema[77], sarcoidosis[78-80], granulomas[81-84], as well as lichenoid[85] and lymphoid reactions[86]. Serious complications such as malignant melanoma[87,88] and basal cell carcinoma[89,90] are also documented. Other non-dye complications reported include necrosis[91], sarcoidosis[92] and uveitis[93,94].

b. Literature Review

The older literature (pre-1975) describes the complications already listed, as well as Darier s disease, chronic discoid lupus erythematosus, keloids, erythema multiforme, localized scleroderma, lymphadenopathy, and sensitization to red (mercury), green (chromium), yellow (cadmium) and blue (cobalt) tattoo pigments[71-73,95].

III Summary of the Literature on Ear/Body Piercing

1. Introduction

Articles describing medical complications of ear piercing make up the majority of published articles in the health literature on body piercing. Epidemiologic studies also include only ear piercing as a potential risk factor for bloodborne pathogens. However, accounts of the rise in popularity of body piercing procedures as well as case reports of complications of these procedures are found in more recent publications. A summary of health-based ear and body piercing literature follows.

2. Ear Piercing

a. Frequency in the Population

The literature confirms that ear piercing is a common practice in females in Western society. Two U.S. surveys reported the frequency of women with ears pierced to be 73%[8] and 83%[9], with reported complication rates of the ear piercing procedure of 34% and 52% respectively.

b. Infectious Risk

Infections acquired as a result of ear piercing procedures include *Streptococcus*[96] (which in one documented case led to acute post-streptococcal glomerulonephritis[97]) as well as systemic *Staphylococcus* infections[98,99], including toxic shock syndrome[100]. *Pseudomonas* infections of ear cartilage have been reported as a complication of high ear piercing (procedures that pierce ear cartilage)[101-104]. Ear piercing has seldom been implicated as the source of infection for viral hepatitis (type not specified)[105-107]. Infections of the earlobe with purulent drainage following ear piercing have also been reported[8,9,108].

Several studies describing the epidemiology of hepatitis B and C have included ear piercing as a potential risk factor, but the results of these studies have been contradictory. Ear piercing has been shown to be both an insignificant[50] and a statistically significant[44,109] marker for HBV infection. Three studies indicated that ear piercing in men is a significant risk factor for HCV infection[58,110,111], while another reported that ear piercing in both sexes is

associated with HCV infection[44]. In 1995 Minuk stated that non-sterile ear piercing was the sole risk factor for HCV in five people who had had their ears pierced[62]. However, a case-control study conducted in the U.K. reported ear piercing as an insignificant risk for HCV[57], and a review by Shimokura and Gully[69] concluded that there is insufficient evidence to indicate that ear piercing is a risk factor for HCV. No literature was found indicating that ear piercing is associated with HIV infection, although this is theoretically possible.

c. Non-Infectious Risk

A wide variety of non-infectious complications have been attributed to ear piercing, which are well summarized in a review by Hendricks[108]. The most commonly described non-infectious complication is contact dermatitis as a result of allergy to nickel or gold in the ear Jewelry[8,108,112-117]. Other reported complications include inflammation, cyst formation[8,9,108,112], trauma/tear of the earlobe[8,9,108], scarring[9,108], embedded earrings[108,118-120], keloid formation[108,121], and sarcoidal tissue reaction[108,122], as well as superficial cervical lymphadenopathy, edema, and hematoma[108].

3. Body Piercing

a. Frequency in the Population

The emergence of body piercing as a popular trend is quite recent in Western society, which may explain the relatively small amount of health literature on the subject. The frequency of these procedures in the population is not documented; however, informal surveys of the numbers of shops carrying out the procedure[123-125] attest to the growing popularity of body piercing.

b. Infectious Risk

Complications of body piercing were recently well reviewed by Samantha, Tweeten and Rickman[126], who reported that there is limited medical literature in this area (which is mainly restricted to case reports), and that there are few reliable data on prevalence. However, infection seen in ear sites may reflect potential complications associated with other piercing areas[126]. Case reports include inflammation of the breast after nipple piercing[127], granulatomous reaction to cheek piercing[128], embedding of studs in nose piercings[129], and Ludwig s angina as a complication of tongue piercing[3].

In terms of body piercing as a risk of bloodborne infection, Shimokura and Gully, in their 1995 review, reported that no epidemiologic studies have included body piercing as a potential risk factor for HCV, even though it is likely a rare but possible mode of transmission[69]. Other possible risks of non-ear piercing include deep tissue infection as a result of seeding , excessive bleeding and scar tissue/fistula formation (tongue piercing), salivary gland injury and blisters (lip piercing), corneal abrasion or eye infection (eyelid

piercing), loss of sensation or movement in a small area of the forehead (eyebrow piercing), cyst or abscess behind the nipple that could impair future nursing (nipple piercing), and urethral damage (penile piercing)[130].

c. Non-Infectious Risk

Further risks of tongue piercing are reported in the dental literature, including chipped teeth, airway obstruction due to aspiration of the Jewelry or swelling, gingival injury, and interference with mastication and swallowing[131], as well as edema, erythema and gingival recession[132]. One survey was taken of 51 individuals who had undergone tongue piercing: 13 reported damage to teeth, eight noticed increased salivation, four experienced gingival injury, three developed infection, and two sought professional medical or dental treatment as a result of piercing[132]. Another reported complication of body piercing was inability to remove the Jewelry to perform surgery on the pierced patient[133].

IV Summary of the Literature on Electrolysis

1. Introduction

Accounts of health complications as a result of electrolysis are sparse in the health literature. Most reports describe electrolysis technique and/or the efficacy of electrolysis treatments for removal of unwanted hair[134-138].

2. Infectious Risk

However, there are reports of verrucae plana (warts)[2] diphtheroid endocarditis[139] and mild folliculitis[136] as infectious complications of electrolysis. A 1985 review article indicated that hepatitis B, herpes simplex and HIV/AIDS transmission as a potential hazard of electrolysis has not been reported[140].

In a cross-sectional study with a nested case-control, electrolysis was not shown to be a significant risk factor for HCV in blood donors in England[58].

In a case control study conducted in Italy with the National Hepatitis Surveillance System, electrolysis was not a significant risk factor for hepatitis B or hepatitis non-A, non-B[44].

3. Non-Infectious Risk

Non-infectious complications include scarring, pain and tenderness[134], crusting[134-136], swelling[135,136], erythema[135,136], whealing[135] and postinflammatory hyperpigmentation in persons with dark skin[135].

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Appendix 1

Glossary of Terms

acquired immune deficiency syndrome (AIDS)

The last stage of infection caused by the human immunodeficiency virus, which most often results in severe damage to the body s immune system.

antibodies

Particles produced in the blood that usually indicate protection against a specific disease, e.g. hepatitis B. Antibodies to HIV do not indicate protection against HIV.

antiseptic

A substance that destroys or stops the growth of microorganisms on living tissue, e.g. skin.

asepsis

Prevention of contamination.

aseptic

Pertains to something being free of microorganisms.

bacteria

Small one-celled microorganisms, e.g. staph (staphlylococci) or strep (streptococci), which can cause infection.

bloodborne pathogens (BBPs)

Viruses found in blood such as hepatitis B virus (HBV), hepatitis C virus (HCV) or human immunodeficiency virus (HIV), which produce infection.

contamination

A disinfected or sterile item or surface that becomes soiled with microorganisms.

cross contamination

The transfer of microorganisms from one surface to another or from something contaminated to something clean or sterile.

detergent

A product, frequently an enzyme, is added to detergents and mixed with water, to clean instruments/equipment.

disinfectant (commonly referred to as a hospital grade disinfectant)

A product with a drug identification number (DIN), used to kill microorganisms on non-living things.

disinfection

A process that destroys or kills some, but not all, disease-producing microorganisms on an object or surface.

epidemiology

The study of the distribution of diseases in the population, including causes, the people affected, trends and prevention/control measures.

exposed

A circumstance of being in contact with an infected person or item in a manner that may allow the transfer of microorganisms, either directly or indirectly, to another person (who is now exposed).

hepatitis B virus (HBV)

The virus that causes hepatitis B disease, which is an infection of liver cells. It takes from six weeks to six months to produce infection after the virus enters the body.

hepatitis C virus (HCV)

The virus that causes hepatitis C disease, which is an infection of the liver cells. It takes from two weeks to six months to produce the infection after the virus enters the body.

human immunodeficiency virus (HIV)

The virus that causes HIV infection and AIDS. It may take from one to six months for the blood to test positive for antibodies to the HIV after the virus enters the body

immunization

A method to produce immunity (protection from infection) using vaccines, e.g. three injections of hepatitis B vaccine over six months.

infection

The multiplication of microorganisms in the body that may cause illness.

instrument

A tool that is used to perform a specific function, e.g. forceps. Instruments are usually made of stainless steel and can withstand heat during sterilization.

microorganism

Commonly called a germ, e.g. bacteria, virus, or fungus.

mucous membrane

Thin sheets of tissue that line various openings of the body such as the mouth, nose, or genitals.

pathogen

A microorganism that can cause disease in humans.

sharps

Any article that can pierce the skin and cause punctures or cuts, e.g. needles, razors.

sterilization

A technique that destroys all microorganisms by heat, chemicals, or gases.

surveillance

To watch over or observe health conditions, e.g. infections, in a population.

virus

A microorganism that reproduces inside human cells and may cause infection.